THE AMERICAN GAS LIGHT JOURNAL

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME XCIII., No. 10. Whole No. 1,839. | NEW YORK, MONDAY, SEPTEMBER 5, 1910. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. H. WADELTON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

OFFICIAL NOTICES—

Annual Meeting, American Gas Institute..... 433
Annual Meeting, Pacific Coast Gas Association..... 433
Experience Section, Pacific Coast Gas Association..... 434

EDITORIALS—

Briefly Told..... 434
Obituary Note, Mr. Henry Mueller—Current Mention.
Proceedings, Sixth Annual Meeting, Iowa District Gas Association—Continued from page 298..... 435
Second Day, Morning Session—Applicants for Membership—Election to Membership—Discussion on the Paper on Depreciation, by Mr. R. Shacklette—Second Day, Afternoon Session—Discussing the Paper by Mr. W. A. Borden, on Distribution in a Small Plant.
The Armstrong Course on Gas Range Cooking.—Nos. 3 and 4..... 439
*Condensers for Small Central Stations, by Mr. H. Pennington..... 440
*Graphic Analysis of Financial and Operating Reports of a Gas Company, by Mr. J. P. Duke..... 446
Recent Patent Issues..... 447

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 447
Bids for Gas Plant, Belle Plaine, Ia.—Olympia Hooked up to Tacoma—An Important Decision—Another Failure in Municipal Plant Management—Three Personals—Contract for the New York Improved Equipment Company.—The Fall River (Mass.) Company Purchases an Office Site—Mr. Miller Explains the Situation—Three More Personals—A Thief and What He Got—Morris Park Section of Bronx District Wants Gas—A Dastardly Crime—Sale of the Delphos (O.) Plant—A Hint from Atlantic City—Franchise Extended, Homer, N. Y.—And Other Items.

The Market for Gas Securities..... 449
Meeting Times of the Various Gas Associations..... 459
Public Lighting Tables for September, 1910..... 462

[OFFICIAL NOTICE.]

Annual Meeting, American Gas Institute.

HEADQUARTERS, AMERICAN GAS INSTITUTE,
29 West 39th St., New York City,
August 17th, 1910.

The Annual Meeting of the American Gas Institute will be held at Headquarters, 29 West 39th street, New York, beginning Wednesday, October 19th.

Hotel headquarters will be at Hotel Astor, Times Square.

It is important to engage rooms early.

The Committee on Arrangements has not entirely completed its programme, but has plans for a banquet Thursday evening, at the Hotel Astor, a theater party on Wednesday evening, for members and accompanying ladies, and a steamer excursion on Friday.

Special rates are being arranged by the Trunk Line and other Railway Associations, details of which will be announced later.

It is planned to have a morning and afternoon session, Wednesday and Thursday, with lunch served in the Engineering Societies Building, between sessions, and to devote Friday to the excursion.

The following hotels have quoted rates:

Name.	Location.	Single Room. Without Bath.	Single Room. With Bath.	Double Room. Without Bath.	Double Room. With Bath.
Breslin	Broadway cor. 29th St.	$1.50	$2.50	.....	$4.00 up.
Gilsey	" " " ".	1.00	2.00	$2.00	3.00 "
Imperial	" " 31st ".	2.00	2.50	3.00	4.00 "
Martinique	" " 33d ".	1.50	2.50	2.50	3.50 "
Herald Square	" " 34th ".	1.50	2.00	2.50	3.00 "
Marlborough	" 36th and 37th ".	1.00	1.50	2.00	2.50 "
Knickerbocker	" and 42d ".	....	3.00	4.00	5.00 "
Astor	Times Square	2.50	3.50	3.50	4.50 "
"	" "	3.00	....	4.00	.... "
"	also, room with shower bath.	3.00	3.50	4.00	4.50 "
Manhattan	42d and Madison Av.	2.50	3.00	5.00	5.00 "
Belmont	" " Park ".	2.50	3.50	3.50	4.50 "
Grand Union	" " " ".	1.00	2.50	2.00	3.50 "
Holland	5th Av. and 30th St.	2.00	3.50	3.00	5.00 "
Waldorf-Astoria	5th Av. and 34th ".	3.00	4.00	5.00	6.00 "
Savoy	5th Av. and 59th ".	2.00	3.00	3.50	4.50 "
"		2.50	....	....	.... "
"	American plan	4.50	....	....	.... "
Netherlands	5th Av. and 59th St.	2.00	3.00	3.00	4.00 "
Plaza	" " " " " ".	2.50	4.00	....	6.00 "
Murray Hill	Park Av. and 40th ".	2.00	3.00	3.00	4.00 "

The Technical Committee announces that it has 16 very interesting papers to be presented, covering technical, commercial and general subjects.

Further announcement in relation to subjects of papers and details of meeting, will be made later. A. B. BEADLE, Secretary.

LIBRARY OF CONGRESS SEP 6 191 SMITHSONIAN DEPOSIT

[OFFICIAL NOTICE.]

Eighteenth Annual Convention, Pacific Coast Gas Association.

PACIFIC COAST GAS ASSOCIATION,
OFFICE OF SECRETARY,
SUTTER BUILDING, SAN FRANCISCO, CAL.

To the Members Pacific Coast Gas Association: As the 18th Annual Convention of the Association, to be held in Los Angeles, Cal., September 20, 21 and 22 draws near, I take this means of once more calling your attention to the same, "Lest you forget." Our general letter advising as to programme and other arrangements will be mailed on or about September 1st, so that in the meantime it is up to you to make your arrangements accordingly to be with us.

Don't miss this meeting, as our President, Mr. W. B. Cline, of Los Angeles, is putting forth his best efforts to make this meeting the meeting of all meetings in the way of papers to be read and the entertainment of members, and it is up to the members at large to respond and show their appreciation of the same.

Yours very truly,
JOHN A. BRITTON, Secretary.

[Official Notice.]

Experience Section, Pacific Coast Gas Association.

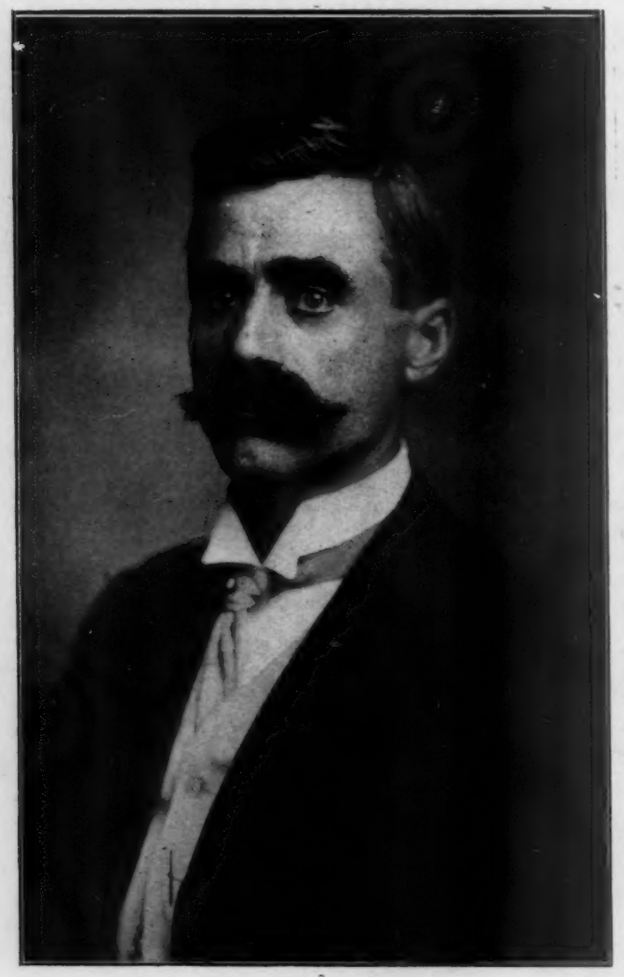
Office of the Experience Editor,
Room 610, 445 Sutter Street,
San Francisco, Cal., June 26, 1910.

To the Members of the Pacific Coast Gas Association: Someone has said that "Education is not the result of a course of study; it is the result of a course of experience." And the Editor of your Experience Department, whom you honored by that appointment at the last meeting, would like to have you share with him a bit of experience that has helped to make you successful, so that he can tell it to the Association at the Los Angeles meeting, which is so near at hand—September 20, 21 and 22. The name of the sender will be treated confidentially, if so desired. Faithfully yours,

Leon B. Jones, Editor.

BRIEFLY TOLD.

Obituary Note, Henry Mueller.—A fortnight ago the Journal chronicled the sudden death, on August 13th, in Decatur, Ills., of Mr.



Henry Mueller, Born March 19, 1858, Died August 13, 1910

Henry Mueller, Vice-President of the H. Mueller Manufacturing Company, of that city. Supplementing that notice, we here give some details of his useful life. Born in Freeport, Ills., March 19, 1858, when still in infancy he accompanied his parents on their removal to Decatur, Ills., where his education was attained, and at a comparatively early age he entered the machine shop of his father, beginning his life's work as an apprentice—the elder Mueller was in his time and day second to none in his particular line—and it was guided by such tuition that the young man absorbed the knowledge which later on added fame to the workings of the even then famous Mueller machine shops. In time, having mastered the machinists' art, he became the head of its designing division, and to his study can be traced the inception of many of the forms of tools that have made the fame of the Company world-wide. And here it should be noted that many of his designs are in reality patented inventions, evolved from his own studious thought. As the Company grew in fame and strength so did young Mueller grow. When the senior Mueller (and grand man he truly was) died, Henry was appointed President *pro tem.*, but when the final executive placing was made, he preferred the position of Vice-President, in that that office and its functions pertained closest to the actual working management of the shops; and here be it said that his cleverness as a controller of men, as an arbiter of the many differences that will arise in places that house hundreds of workmen of varying types, and these are in such situations naturally of so many sorts, his success was marvellous. And the secret of his great power in this success was never through intimidation or harshness, rather through suasion and kindliness, always controlled by dignity and firmness, his victories were accomplished. Really in the above story is his business life recorded. Naturally, he had other and important interests than those incident to his life's work in the Mueller Company, and he was also prominent in the social paths of his city, of the best development concerning which he was ever zealous and watchful. The home life of deceased was of that harmonious leaven which has within it love and faith as the components, and no happier home life than his could be experienced, and to his mother and to his widow are the knowledge that as the first inculcated so did the latter broaden the principles which made his home the haven of happy life. His widow and one child survive him, also his mother, a sister and 5 brothers. And while it may not be considered germane to the subject, the writer may not forbear the remark that one seldom sees or knows a family so bound together in the ties of harmony. The funeral services were held in the Mueller residence in Decatur, the afternoon of August 15th, the Rev. O. W. Lawrence of the Central Church of Christ, officiating, the beauty of the death service being greatly amplified by the chanting of the Mueller Glee Club. The attendance of mourners included one in every ten of the residents, and the escorts to the cemetery (Greenwood) were the employees of the Company, a striking testimonial to their estimate of his worth as an employer.

CURRENT MENTION—

At a meeting of the Directors of the New Jersey Gas Company, held in the home offices, Drexel Building, Philadelphia, the 24th ult., the resignation of the Presidency, by Mr. John Graham, was accepted, and Mr. Edward H. Stokes, of Millville, N. J., was chosen in his stead—Mr. Graham, however, continues on the Directorate, and also serves as Chairman of the Executive Committee. The other officers are: First Vice-President and Treasurer, B. L. Van Schaick; Second Vice-President, H. G. Peddle; Secretary, Jos. R. McClure.

The proprietors of the Citizens Railway and Light Company, of Muscatine, Ia., the last week in August issued a notice informing the residents that for gas used through one meter in any one month the following rates would prevail:

Quantity.	Per 1,000.
First 1,000	$1.25
Second "	1.20
Third "	1.10
All over 3,000	1.00

The Company further intimates that at the option of the customer it will sell gas on the readiness-to-serve-plan at 90 cents per 1,000 gross, less 10 per cent. per 1,000 for prompt payment. This rate is based upon the maximum demand of the consumer, for which demand a fixed monthly charge is made, independent of the gas used. The circular also gives much information about the change in rates; and, in fact, the text and sensible make-up of the circular and its teachings are about as well put together as any like topic circular that ever came to the Journal office.

The new net rate of $1 per 1,000 cubic feet on gas furnished to the city by the Troy (N. Y.) Gas Company, becomes effective the 1st prox.

The health officials of Staten Island (the Richmond Borough Section of Greater New York) have, after examination, declared that the odors escaping from the works of the New York and Richmond Gas Company are in no sense prejudicial to the public health, as was charged by some of the ultra purist residents of the Clifton district of the Island. Vice President Walsh, however, is willing to admit that the works is not altogether a perfume manufactory.

[OFFICIAL REPORT.—CONTINUED FROM PAGE 298.]

SIXTH ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.

HELD AT SIOUX CITY, IOWA—JUNE 15-17, 1910.

SECOND DAY—MORNING SESSION.

President Waring called the meeting to order at 10:30 A.M., and the Secretary read the names of the following

APPLICANTS FOR MEMBERSHIP.

F. L. Clisby, Parker, S. D.
H. L. Griffin, Ames, Ia.
C. H. Grimm, Blair, Neb.
W. H. Lyon, Lyons, Neb.
H. A. Nash, Perry, Ia.
J. P. Smith, Maquoketa, Ia.
H. C. Stevenson, Fairfield, Ia.

ELECTION TO MEMBERSHIP.

Upon motion, the Secretary was instructed to cast the unanimous ballot of the Association for the election to membership of the persons named. The Secretary later on announced the ballot was duly cast.

Mr. Thomas Crawford extended an invitation to the Association to hold its meeting in 1911, at Clinton; and, on motion of Mr. Clabaugh, Clinton was selected as the next meeting place.

Mr. Norman Macbeth then delivered a lecture on "Illuminating Engineering Factors in Gas Illumination," which was illustrated by stereopticon views. On motion of Mr. McLean, a vote of thanks was tendered to Mr. Macbeth for his valuable and instructive speech.

The President then introduced Mr. R. Shacklette, of Detroit, Mich., who read his paper on

DEPRECIATION.

[For the text of the Shacklette paper, see JOURNAL, July 18, p. 106.]

Discussion.

Mr. Forest—I don't know that I can add anything to this very valuable paper in the way of discussion. However, there are many ways of looking at the question of depreciation. In the first place the most important thing is to consider the original organization and capitalization, both financial and individual; that is, the men back of it, and a consideration of what their ability amounts to. Looking to the future of the business, it simply means that some provision must be made to take care of the natural wear-and-tear, because things will wear out, just the same as men do, and the time comes when their usefulness is gone. The subject of replacement, of course, means that it must be provided for in one way or another. It is a question in my mind whether the little fellow with only his own capital invested, who controls his business, who has no watered stock and no stock scattered among a thousand-and-one small shareholders, would find it advisable to lay aside a certain sum of money each year out of his earnings to provide for this renewal. To my mind it would be considerably the same as the banking institution putting by a reserve fund, which is merely increasing its working capital without issuing more stock. There is no law to prohibit a bank declaring a dividend for any amount that it desires upon its earnings, and there is no law that would prohibit a public corporation from doing the same thing. Now, when we get down to the little fellow individually owning his own plant, without any distribution of stock, we might go right back again to Mr. Shacklette's illustration of the automobile. We will say, now, that Mr. Automobile Owner should, when he buys 5 gallons of gasoline for his use, put 15 cents more in stock as a reserve to cover the possible spark plug that he must buy a little bit later; or he must, when he buys a new tire, put by a little more additional in a little box put under his bed that he can draw from at some future time to make his automobile good, when it comes to the point that it is necessary to replace it by a new one. Now, these are things that Mr. Owner and Mr. Operator will look upon in a little different light. If the company is a large one, and the stock is distributed promiscuously, to protect those small shareholders a fund is provided so that it is never necessary to sell additional stock; but, on the other hand, the little fellow doing business as an individual must have some other asset besides that which he has invested in the gas business, or depreciation will eat him up. If he keeps taking his profits out and investing them in other ways, or if he makes injudicious investments, he eventually takes his loss. Thus, I say, we can look at it in different ways, and each one must decide for himself as to how that account shall be carried. It is a loss that must be met sooner or later. The renewal expense must be met and the upkeep must be looked after.

Mr. Crawford—In my paper last year, regarding the price of gas, we had considerable discussion, and this question of depreciation then came up. Since that paper was written I have had any number of letters from all over the country regarding the price of gas, and whether we take care of depreciation or not. Now, the question of depreciation depends much on how you start out. If one has his own money to put in the business, he is going to build a plant, expecting to operate it himself for a profit; he doesn't want to lay aside anything for depreciation. If he has to buy a new belt for the blower, or new lubricators, or new generator linings, he will go ahead and buy them, charging them up, and it makes his profit that much less; but in the larger plant, which is capitalized and organized on a different line altogether, I believe there should be a depreciation account. Of course, in a large organization there is a way that this can be taken care of. If we had the commission plan, they would allow us to lay aside so much for depreciation every year and cause it to be exempt from taxation. I think the question of taxation is something that should have been touched on in this paper. But if there was a way that everybody could lay aside so much each year for depreciation, it would be a good plan. A small plant man can't. Another objection to laying aside very much for depreciation is that it cuts down your dividends and decreases the value of your stock, if you want to sell it. Of course, that can be taken care of under the commission; those things could be regulated. As far as the automobile is concerned, I don't think it should enter into this kind of a discussion at all, for it is nothing but a bill of expense from the time you buy one—I know this from experience. I don't think there is any comparison between a man owning an automobile and a gas works. In the case of the automobile I think you should add up all your expense and interest on the money and charge it off against the amount of "joy" you have had out of it.

Mr. Adams—I would like to ask Mr. Shacklette why he classifies bench renewals differently from the rest of his depreciation, and sets aside 2 cents per 1,000, putting the amount into a reserve fund. Benches have a life tenure, the same as mains or anything else, and why shouldn't this go into the depreciation fund?

Mr. Burt—One phase of this depreciation question which seems to me worth taking into account is an offset, really, against depreciation. To illustrate, I heard a gentleman in a directors' meeting a few weeks ago say that, in 1881, he purchased a piece of property in Waterloo for $2,000, and the day before he had sold it for $25,000. He was considered a shrewd man and entitled to the increase in value. Now, if you stop to think about it, how much of that increase in value was due to the efforts of the electric and gas companies at Waterloo, and the money invested in their property? I would say that the gas company was entitled to a return or some share in that increase in value, and when the plant deteriorates, and has to be renewed, one way to get funds would be to have the community pay back that increase in value. It may seem a little like high finance, but we are coming to look at things a trifle differently from what we used to. I believe the farmer who sells his land for $150 an acre, when he only paid $20 for it, is reaping the benefits of increased valuation from just these sources, and that as an offset against depreciation we are entitled to secure some benefit in such way.

Mr. Green—I believe last year I was rather opposed to the plan Mr. Shacklette mentions, but I wish to say that to-day I am heartily with him. Even with a small plant a person has to make some arrangements for replacing old machinery. The point I tried to make a year ago was that the maintenance account we carry is sufficient to take care of depreciation, but the little discussion set me thinking, and I am thoroughly convinced that you have to save up some money besides what you put in for making repairs and renewing of machinery to take care of depreciation which inevitably will come. Following out the matter Mr. Burt just mentioned in reference to real estate. If a person buys a piece of real estate, the chances are, 99 times out of 100, that it is going to increase in value. Why? Because real estate is getting scarce; there is a limited amount of it. Science is making the ground that we have more valuable every day, and it redounds to the benefit of the owner of the land; but when you erect a gas plant, or any other mechanical operation, it is directly opposite. Everything that science is doing is causing depreciation in the value of the property that you have, to say nothing of the wear-and-tear that the operation of the machinery causes. I am more than ever convinced that even a small plant has to lay aside something every year to take care of the replacement. In connection with taxation and dividends. There are very few people who take it into con-

sideration, if they are not connected with gas or electrical companies, or some other manufacturing concerns—the wear-and-tear—and if it is reported that the companies are declaring dividends and making money, they are naturally after you to cut down the price of your product. It is getting that way, even in the smaller towns. To offset it, a certain amount of money should be laid aside each year, and it might be kept on hand for a number of years in a maintenance account, but not shown up in connection with the earnings of the company.

Mr. Adams—I don't believe there is any argument on the subject as to whether or not we should set aside something for depreciation, for I think that is conceded by all the public commissions and by every court. The question is, how are you going to get at it; on the cents-per-thousand basis or on the life basis? Of course, to get your cents-per-thousand you have to go back to the life basis anyway. But, after you set it aside, what are you going to do with the money? That money should go back into the plant; you should call it surplus or investment. I would like to know how to get at this depreciation, and after you get at it, what you are going to do with the money. This Association ought to go on record as to what should be done with it.

Mr. Addy—Whatever one may think about depreciation in general, it seems to me we are all agreed on some points in this connection: That certain parts of a plant are continually wearing out, and the repairs to which will come in considerable amount at one time. For instance, in running a coal gas plant there are bound to be certain repairs to the benches which will come at fairly long intervals. We have to refill certain benches at certain intervals, and it seems to me in providing for these it is much wiser to divide up the charges than to wait until the benches are practically worn out and require refilling, than making a large charge all at once for repairs. In order to provide for this, it seems to me it is much better to make a journal entry each month, charging to bench repairs an amount which would be sufficient to provide for them, and crediting bench repairs or whatever account you wish to open. In the case of bad debts, we all know that we will be unable to collect some of our accounts; but instead of waiting until the end of the year, charging against our profits the total amount of debts which we think we can never collect, it seems to me it is much better to charge each month. Then, at any time, when we find we are unable to collect certain accounts on the books, we can charge those accounts to our bad debts reserve. Another way to handle repairs of that sort, if we had to buy a large amount of repair material, would be to charge this material into the storeroom account, then each month credit that account with a certain proportion, charging it against our water gas apparatus or any other apparatus until the storeroom account is balanced, whether this amount of material were used or not. Those are all items which it seems to me we all agree we have to charge against expense at some time or other, and I believe it is much better to charge them month-by-month in some way similar to that which I have mentioned than to wait and charge them all at once.

Mr. Forest—If I have my gas business in my right hand and my real estate business in my left, I can't see how it makes any difference whether I take 6 per cent. out of the gas business in my right hand and put it into my real estate business in my left, and then, when my gas business needs renewal, take it out of the real estate business in my left hand and put it into the gas business in my right.

Mr. Crawford—I would like to ask Mr. Green how they take care of additions to their station. Do you issue more stock or take it out of your earnings?

Mr. Green—Whenever we have any extensions to make in the way of installing second boilers or second generators or mains, if we do not have enough money to pay for such, we borrow it, paying for it out of our earnings, and when we make such improvements we simply put them in, crediting the storeroom account for what we take out and charging it to mains' account.

Mr. Crawford—That brings up the point I made on the importance of the taxation question. If Mr. Green does that, he should have some way of showing that he put that much in repairs, and keep his original investment down. In a large company we don't take the money out of our earnings to pay off that borrowed from the bank, and I was just wondering how the small companies worked it.

The President—It might be interesting to know if Mr. Forest keeps any books between his real estate company and his gas company.

Mr. Forest—The gas company's accounts are entirely separate from anything else; I don't mix them at all. I have a record by which I can show every year just what it has done. The capital stock has never been increased since we started business.

The President—Do you think your plant will be worth as much 20 years from now?

Mr. Forest—No, it won't; because we keep taking out of it all the time the earnings. The plant is naturally wearing out, but where it is an individual concern what is the difference when I have that surplus or depreciation reserve invested in real estate that is outside of the gas business? When the time comes that I need to look out for this depreciation, I can sell a piece of land and put it into the gas business.

Mr. Green—It seems to me that idea goes right to the matter of taxation again. If he uses that plant for 20 years and doesn't improve it, at the end of 20 years he will have something that is worth nothing, because I believe there is 5 per cent. depreciation a year, yet he will be paying full taxes on that plant all the time, whereas on account of the depreciation he ought to have his taxes reduced. But if he has a depreciation account, and keeps putting money back into the plant, when the mains or generators or boilers wear out putting in new ones to take their place, he would have a plant just as valuable at the end of 20 years as he has to-day.

Mr. Burt—I think it is a pretty good scheme if he puts his money into real estate and takes advantage of the increase in values. It doesn't make any difference whether he puts it into a savings bank or real estate, so that he gets the increase in values.

Mr. Crawford—To quote again what I said last year, Mr. Forest and Mr. Green both think their plants are worth more to-day than they were yesterday. They are selling more gas and their plant is more valuable. Everybody's gas business should be increasing every year. It is not the kind of shape your main or your manufacturing apparatus is in, it is how much it is making.

The President—I think if Mr. Forest had the City Council cut the price of gas in his city, he would be better off if he had a depreciation account to show them clearly what the amonnt of depreciation was, rather than to introduce testimony at that time to prove it. Personally I am interested in a small gas plant, and the price of gas was cut from $2 per 1,000 to $1.50, and we were able to show that our depreciation would not allow this cut. We took it to the U. S. Supreme Court, and it was so self-evident that we won our case. We then compromised on $1.75, which was not confiscatory; but $1.50 would have confiscated the property. Unless you have a depreciation account, or some idea as to what depreciation you have, when the price of gas is reduced you cannot readily show that it is confiscatory. This discussion is largely for the small gas plant rather than the large one, because it has been the history of the small gas plants in this district that they start out with flying colors, and at the end of 20 years go into the hands of a receiver. Probably a great many of them will repeat the experience in the next 20 years. I think this matter of depreciation is more vital to the small plants than it is to the larger ones, because the latter plants keep up their replacements better; but it comes all at one time in the little plants. Last year we had a paper on "Construction and Operation of a Gas Plant," and we had a much more enthusiastic discussion on depreciation under that subject than we have had under the subject of depreciation. I should think there might be some more questions to ask before this discussion is closed.

Mr. Forest—You haven't told us yet how to handle this depreciation account. Do you keep it in the savings bank or invest it where it is available? How do you take care of that?

The President—The depreciation is charged to operating, and the assets account is reduced the same amount that we charge to depreciation.

Mr. Forest—What do you do with the money?

The President—Whatever you please with it; reinvest it in the business, for instance.

Mr. Clausen—We have heard men who have been in the gas business 40 or 50 years talk on depreciation, and there are just as many angles to the views of the different gas men throughout the country as there ever were. You can step into almost any gas convention, and when the subject of depreciation gets started nearly every man will have a different view of the situation, although they all agree upon the point that depreciation should be anticipated and a sum set aside for the purpose of renewal. Bench repairs, of course, constitute an account that must be met every 2 or 3 years, while on machinery the life varies from the exhauster to the purifying plant, and, as far as the exact depreciation of these various items goes, a man must use his own judgment or the experience that he has had, to arrive at the

definite facts as to how much he ought to charge off each month for the depreciation of the plant. The amount of money set aside each month and what to do with it are, of course, matters that must be left to each company. I don't believe in putting it in a savings bank. It should be an account that you can draw on at any time; that the credit should be there for the renewal whenever it should be met. As far as I can see, I do not think any gas man wants to put his money into a savings bank when he has street main and service extensions to make and meters to buy, and have to issue new stock to take it up unless he has money in the treasury to cover these construction items. But many a gas plant has not sufficient capital to take care of these items necessary to a growing plant, therefore these different items should be taken care of by charging them off and putting the money back into the business.

Mr. Burt—As a practical suggestion, when I took charge of the Cedar Falls plant 10 years ago, this question of depreciation was something of a theory, and I had a proposition that was put in practice there. We invested in the plant about $27,000, and I took an arbitrary figure of $1,500 a year—$125 a month—charging that to operating expense, and each month charged against that fund any repairs to the plant; and, as a rule, there was a surplus in that account. Of course, it made the profit account less by $125 a month, but it took care of the ordinary repairs. At the end of 1½ years we paid two dividends out of the surplus over and above this amount, simply as an arbitrary figure, and it seemed to work out very well.

Mr. Forest—Before Mr. Shacklette closes this discussion I would like a word from Mr. Clabaugh on the subject of depreciation.

Mr. Clabaugh—I didn't intend to talk on this subject at all, but I fully believe in a depreciation account. I don't see any particular reason why we should fool ourselves each and every month as to our profits, whether it is a small or a large plant. As to what we should do with the money, I think we can all use all the money we can get and use it profitably. That, of course, is up to the management of each and every plant, for I think very few plants can run right along that are not borrowers from the bank. It is a question of bookkeeping entirely, for, when we declare dividends, as a rule we do not pay out all of the money that we have made during the year. I think it would be a very unwise thing to so do. I think we should at all times, if possible, have a surplus to use for emergencies or anything that may arise. I think the depreciation account is more valuable when it comes before a commission than it is when when we are not up against that proposition, and it looks to me as if most of the States would, in the very near future, have a commission to deal with. As the commissions allow a certain per cent. to be made—5, 6 or 7—rarely ever above that (which is not large enough, in my own mind), I think we have to get ready for that commission. While the plant may appreciate in value, on account of the business having increased, at the same time we do know absolutely that it is depreciating in value, and while we are spending every month so much for repairs, in order to keep the original capital in *statu quo*, we know at the same time that one day those repair accounts will have to be renewed, in spite of the fact that they have supposedly been charged up and have kept the apparatus in its original condition. Now, then, shall those renewals be made from immediately increased capitalization or a surplus that has been charged to depreciation? It is a pretty significant subject. I can understand Mr. Forest's idea perfectly, and from one standpoint I think it is good financiering. If Mr. Forest thinks he can make more out of his depreciation money by putting it into real estate, which is enhancing in value, than by charging it up in his account, he has acted in a very shrewd way; but at the same time I don't see why he can't charge up the depreciation account and use that money in his real estate just the same. Then he has the depreciation account on his books, and if he ever has to show them, he has something against the wear-and-tear of his apparatus.

Mr. Shacklette—In the first place I want to say I wrote this paper and made it brief with the idea of bringing out some points of depreciation. It was not my idea to outline a policy of the way of carrying these accounts, but rather to bring up the point of the necessity for it. Mr. Forest said he didn't see any necessity, every time he put some gasoline in his machine, setting aside 15 cents for another gallon or the price of a tire occasionally. I want to say that, if Mr. Forest doesn't have that 15 cents for a gallon of gasoline, or for a new tire, in his "jeans," some morning he is going to be unable to ride in his automobile, because those tires will wear out. Whether he carries that simply as a surplus in his pocket, or as a fund for replacements on his automobile, is immaterial; but in dealing with the public he should, itseems to me, have those amounts show in proper form; it doesn't matter how he does it. He says he wants to put his money into the real estate business. Then, as I see it, at the end of the life of that plant he will have shifted over from the gas business to the real estate business or his capital will have disappeared from the gas plant and gone into the real estate. The insurance companies have now put out a policy which pays your estate a certain amount per annum instead of the lump sum that used to be paid for the protection of your family against sharp attorneys or unwise investments of one kind or another. Now, in the depreciation account we are doing that very thing; we are protecting that plant and the investors in it, as I see it. Mr. Crawford says that an automobile is a bill of expense continually. I don't want to overwork the automobile parallel, but so is any capital invested a continual bill of expense, in addition to the taxes. If you are to keep that asset up in prime condition for the investors, then it is a continual bill of expense, whether it is in an item where you can see the depreciation from day-to-day, or whether it is one lump that won't be visible for a number of years. If in the capital account, in the column opposite the capital is the amount of depreciation, the actual taxable value must be the difference between the two. If, as Mr. Forest says, he wants to carry all of that, and has no depreciation, then he is paying taxes on depreciation, and he doesn't want to pay taxes upon a depreciated value, and that is what happens when it doesn't show on the books, unless he technically lies. Mr. Adams asked about the 2-cent charge on benches. I don't think it matters how we carry the different depreciation accounts, but bench refills are mostly in direct proportion to the amount of gas made in those cities. Whether they have been used continually or not, when they carbonize about so much coal, they are gone; so a direct per 1,000 charge seems to me the simplest way. In other accounts you can't do that. The life of a holder, a meter, the mains, has no relation to the amount of gas which passes through them, and you reduce your per 1,000 of depreciation in proportion to the high efficiency with which you work the plant. As to investment in the plant, I have been connected with properties in cities of from 6,000 to 400,000 population, and particularly with one where I was directly responsible. My trouble has always been to accumulate a surplus account while taking care of my extensions. If I had a property where my depreciation charges could not be absorbed from year-to-year in extensions, and so increase my invested surplus in proportion to my depreciation charges, I would transfer that property. Either there is something wrong with the operation of the plant or with the town, if it won't absorb that. Most of us want large additional capital beyond anything which could be provided from surplus. I think this answers Mr. Green's comment that he cannot put such in extensions. When he buys a new boiler, if he has set aside the depreciations against that boiler, and used the money for something else, there is collateral against that money. If you will put your depreciation into invested surplus, and then when you get to the point where you need more capital, issue bonds against it, it is a simple matter of bookkeeping. Mr. Burt and Mr. Crawford both speak of appreciation of real estate. I think that is the only item about a gas plant which has an appreciation, rather than a more or less rapid depreciation, and usually the assessor will take care of that. If he shoves it up from year-to-year, you are warranted in shoving it up on your own books and adding to the surplus, if you care to do so. Mr. Waring says he reduced his capital account by the amount of depreciation. It seems to me, for various reasons, that is not so good a plan as to carry a separate depreciation account, and so at all times the capital account itself shows the amount which has been invested from time to-time, and against depreciation allowance. Mr. Clausen says we have this item of depreciation coming up each year, and we always will have it until we all take care of it. It is immaterial, I think, how you do it, but it is there and must be provided for in one way or another.

The convention thereupon adjourned to 2 P.M.

SECOND DAY—AFTERNOON SESSION.

The President introduced Mr. A. W. Borden, of Hastings, Neb., the topic of whose paper was

DISTRIBUTION IN A SMALL PLANT.

[For the text of the Borden paper, see JOURNAL, July 25, p. 156.]

Discussion.

Mr. Bertke—If I understood Mr. Borden, he said that holders should be carefully scraped and painted once a year. I take exception to that. I think if that job is done properly at the outset, it would be a

waste of money and time, for a properly laid on paint will last more than 1 year.

Mr. Shacklette—Mr. Borden said he put in lead expansion joints in every 10 or 12 lengths of pipe, and that he thought an expansion joint should be laid in every block. I would like some information thereon. It was my experience, when I put in an expansion joint at one end of a block, the main broke in the middle or at the other end; it doesn't stretch at the point where I thought it would. I do not believe a cast iron pipe would draw 10 or 12 lengths through any soil. Possibly it would through wet clay, but it certainly wouldn't through sand. If anybody has any more accurate information on the subject, I would be glad to hear it.

Mr. Mathews—In Grinnell we put an expansion joint every 400 feet, and we had a very severe winter there last season.

The President—Mr. Borden referred to cast iron pipe.

Mr. Mathews—Ours is wrought iron.

Mr. Shacklette—I referred to both.

Mr. Mathews—We have had no leaks and no breaks at all in something over 14 miles of main.

The President—Does anyone present make cement joints only in cast iron pipes, without any lead joints?

Mr. Chubb—When we started to put in cement joints we thought it was necessary to put in a lead joint every 10 or 15 lengths, but we have discarded that plan and don't use any lead joints at all in cast iron pipe. In wrought iron pipe we have put an expansion joint in the middle of each block. The blocks are about 350 to 400 feet long; but I don't really believe that is necessary. I think wrought iron pipe is crooked enough so that it will take up any expansion or contraction that might occur.

The President—For the information of anyone who would like to look this matter up in regard to cement joints, a paper read by Mr. Von Maur at the American Gas Institute meeting at Chicago, will be found very exhaustive. Mr. Von Maur was not satisfied to give his own opinions in regard to this, but wrote to representative gas companies all over the United States. As I remember it, he demonstrated it was absolutely unnecessary to have any lead joints; that you could run your system anywhere with cast iron pipe with cement joints and have no fear of it breaking; personally I know of several places where they are doing that.

Mr. Shacklette—In laying cast iron pipe I have not used lead joints for a considerable time; I am using cement altogether. I fail to find any more breaks in the mains traceable to that. Having occasion 2 years ago to lay a high pressure belt line, I wrote pretty much all over the country to find out the proper connection to use with high pressure mains. I got recommendations for expansion joints, all the way from 200 to 1,000 feet apart in steel pipe, and I couldn't reconcile the two extremes and didn't put in any. I never had a break in that line, which is 1¼ miles long, and has now been in the ground 1¼ years.

Mr. Jones—We might get a little information from the steam roads, which I understand have been laying continuous lines. If the hot sun in the summer and the frost in the winter will not cause contraction and expansion, I don't see why there should be any trouble with a gas main under ground.

The President—Has anyone experienced any trouble in laying a main on a hillside from a broken joint caused by the pipe creeping down the hill? Has anybody ever had a case where the pipe was broken because of not having an expansion joint? It would seem from our experience that this expansion joint idea is strictly theoretical, not practical at all; that we assumed there was an expansion that had to be taken up with an expansion joint, and have been wasting our efforts.

The President—The only great advantage in using an expansion joint in laying wrought iron pipe is that you can lay 200 or 300 feet with an expansion joint more readily than by screwing length by length.

The President—You refer to very large mains?

Mr. Johnson—To 4 and 6-inch pipe.

The President—This paper, I believe, particularly applies to very small gas plants, where they run 2 and 3-inch pipe, and, as I understand the custom, with these expansion joints they are putting in a lead joint. They take a pipe of a larger size, butt the two ends of the main together and make a lead joint over that. Such is the style of expansion joints that I have seen largely used in small gas plants.

Mr. Jones—Isn't it true that, where you have many consumers in a block, an expansion joint is practically of little value, from the fact that each service connected with the main helps to make the main absolutely rigid, and you have a dead main, as you might say, when there are many services on that main? As a matter of fact, I have been putting an expansion joint in every block, but I believe it is no use.

The President—Gentlemen, this discussion is not confined to the laying of mains; we would like to hear from you on other phases of the paper.

Mr. Kellogg—The gentleman referred to taking pressures in growing districts every year. Does he put those pressures at any particular time of the day, or on a gauge, to give him a chart of 24 hours, or whether he uses a weekly chart? In our experience we have found the only practicable way to get the information we want is to take a weekly chart. The gauges are made for that purpose and are certainly very much better than the daily chart, and the daily is much better than a momentary pressure. Mr. Borden states in his paper that if this loss item is found to exceed about 4 per cent. of the total sendout, or in the case of a widely scattered distributing system it runs about 40,000 to 50,000 cubic feet per mile of main per year, as reduced to a 3-inch standard, it should be investigated. Are you all in accord with that statement? Are you satisfied that you should do something as soon as your leakage reaches the point described by Mr. Borden?

Mr. Bertke—The figure is usuall y put at about 150,000 cubic feet per mile of 3-inch main per year.

The President—Mr. Borden says 40,000 to 50,000, Mr. Bertke 150,000. That is quite a serious item of difference; we ought to get some figures upon which to work.

Mr. Addy—I don't pretend to be an authority on that subject, but, as far as I have an opinion, it would be that one figure is too low, the other one too high. I should say about half-way between those two points would be about right.

Mr. Chubb The system we have at Sioux Falls is 30 or 40 years old, probably half of which is wrought iron pipe, and, previous to the time I went there, the leakage was in the vicinity of 200,000 cubic feet, and we figured we could afford to spend $1,000 to cut that leakage down one-half. We went over the whole system, with the exception of the paved streets, which probably do not include more than 25 blocks, and spent a little over $500, and our leakage has been less than 150,000 cubic feet per year, per mile of 3-inch main. Considerable of the leakage left I know is in the paved district, and we expect to go through that thoroughly this year. I think if any company can get its leakage per mile of main per year down to 125,000 cubic feet, it is doing quite well in the average main system.

Mr. Bertke—Do you use that figure as your basis, and if it is more than that you start to examine?

Mr. Chubb—I shouldn't think it necessary to make a thorough investigation of the mains, if my leakage were not more than that. One point has been left out so far in the discussion on pressures is that it is not only necessary to take pressures in the new parts of town, or those that are being built up rapidly over the entire system each year, and these pressures should be taken at the same hour on the same day all over the city.

Mr. Hopper—In Des Moines it is the practice to take pressures once a year, and we usually take them in October. The cooking and the lighting loads overlap at that time, and our heaviest hour is at sundown. In the outlying districts, or in places where we particularly wish to have a continuous record of the pressure, we put on a 24-hour Bristol recording gauge, and at other points we send out men with common water U-gauges and, putting the latter on a few minutes before the time that has been found to be what we call the peak load, or where the maximum quantity of gas is going out per minute or per hour, watching it until it goes down to the lowest point, and they record the lowest point all over town, that we consider is the pressure in each district.

The President—One serious problem in operating a very small gas plant in a town of 5,000 or less inhabitants is the testing of consumers' meters. I would like to know how some of the small gas works are doing that; whether they have a meter prover, or what is the most economical way. If a man has only 100 or 150 meters, it is quite a hardship to have to purchase a meter prover. I would like to know how Mr. Houck tests his meters.

Mr. Houck—I test them the best way I can. I generally take a dozen new meters and test those out first, and then take the one which I think is nearest right, using it for a testing meter. It is, of course, a very crude arrangement. I would like to know what the usual practice is where the system is too small to have a meter prover.

Mr. Smith—That question came up with me a couple of years ago on taking charge of a small plant. I investigated and found out that

the cost of the standard meter provers put them practically beyond our reach, and in our locality the freight on meters would be too great to warrant us in sending them to any place having a meter prover to try them out thoroughly. I looked around to determine the best thing to do, and found I could purchase a meter (quite accurately constructed) which had a recording dial instead of the regular dial on the straight reading meters; it was graduated in hundredths of a foot. It carries a large dial about 3 inches in diameter. I connected it up on the bench in such a manner that I could connect any of the other meters of which I had any doubt as to their accuracy in series with it. I first let the gas pass through the test meter, as I call it, and then through the meter which I am testing, noting the position of the test hand on the regular meter, and also the position of the index on the test meter, and from that I compute whether the regular meter is correct or not. That meter cost me, I believe, $12, and I find it to be quite accurate. I returned it to the factory once since I got it for re-testing and re-adjusting, and, by keeping it readjusted once a year, I can hold my other meters quite accurate to proper adjustment.

The President—If there are no other questions, I will ask Mr. Borden to close the discussion.

Mr. Borden—I mentioned the painting of the gasholder yearly. We have to accept some sort of a ruling, I think, on questions of this kind. Mr. Bertke has taken exceptions to that. I presume he has a holder of about 100,000 feet; we have two holders, one 20,000 and one 40,000. I don't think it is quite a parallel case. I have taken the standpoint of one operating quite a small plant, and believe the little we spend on painting our holder once a year is a small item. It gives us a chance to thoroughly inspect its seams, and I don't think the cost excessive. It doesn't cost very much to cover a 40,000-foot holder and a 20,000-foot holder with a single coat of good painting. So far I have done that each fall. In a large holder the metal is considerably heavier and there is a large item of cost. As to the matter of expansion joints every 10 or 12 lengths of cast iron pipe, I presume that is more or less a theoretical standard. I gathered that in former years, and can't honestly say I ever saw or knew of a ruptured joint being occasioned by the elimination of that expansion joint; but I have supposed that the laying of a lead joint in every 10 or 12 lengths adds so little to the cost of time construction of that, even if a questionable advantage was to be gained by putting it in there, we were safe. Mr. Mathews, I think, suggested an expansion joint be used in each 400 or 500 feet of steel pipe. That would be a small steel main—2 or 3-inch, I presume?

Mr. Mathews—Two to 5-inch.

Mr. Borden—That has been the practice I followed. In that case I can't say I have known of a line of wrought iron main having been ruptured through the elimination of the expansion joint; at least I have never known of its having been laid directly to that cause. Replying to Mr. Kellogg's question, we have a town of about 12,000 people, and some sections of it have grown very rapidly. We have taken those pressures at the time of our peak load each year, as they do in Des Moines, in accordance with the Secretary's suggestion, with an ordinary U-gauge, and arrived at our conclusions from that basis, only we have never taken any pressures on the recording gauge, for I have not as yet felt it necessary. I presume in a larger plant that is the only way in which one could get a true figure to base your calculations. There seems a wide diversity of opinion between the figures that I have quoted, for a conservative actual leakage per mile of main, and the standard taken by some of the other gentlemen. In that connection I would simply say that if my leakage approximates 60,000 feet per mile of 3-inch main, I feel somewhat alarmed about it. I suppose, however, our system, being rather new, and the majority of our mains new, that I have created a standard from the fact that we haven't a great many old mains and our leakage is very low. I am very glad to say I try to keep it that way; but in a large city, where there is an old system of mains, possibly that figure is entirely too low to furnish a conservative basis for calculation.

(To be Continued.)

THE Massachusetts Gas Companies offer of $80 per share for the outstanding stock ($1,250,000) of the Boston Towboat Company, has been accepted. To settle the trade it was necessary to obtain or secure two-thirds of the shares issued, which fraction has been more than pledged. Shareholders not in the assenting class had until Wednesday last to decide.

[Published with Permission of the Author.]

The Armstrong Course on Gas Range Cooking.—Nos. 3 and 4.

[By MRS. HELEN ARMSTRONG, Lecturer on Domestic Science.]

LETTER NO. 3.—*Broiling.*—There is no more wholesome method of cooking meats than by broiling, and, if the meat is tender, the result is ideal. In the days when broiling was only possible over coals, we cannot wonder that so few women cared to do it, because the work was uncomfortable, the kitchen filled with smoke and odor, the meat often charred, sometimes ruined. Now the process is so easily accomplished, no overheated kitchen (and cook), no smoke, no scorching; the result, a juicy piece of meat with a crisp surface and all prepared with comfort and dignity on a double oven, cabinet range—we do not have to stoop for broiling on the range of to-day.

Meat suitable for broiling should be fairly tender and surrounded by fat, otherwise the result will be dry and hard. If there is no fat on the meat, brushing over the surface with softened fat will improve it. Should the fibers be tough, close scoring of each side with a sharp knife will break these and not spoil flavor or lose the juices, as occurs when meat is pounded; but for broiling it is better to choose tender cuts, reserving the tough pieces for other purposes. The edge of the meat should also be cut through in several places to prevent it from curling up, as the outer skin contracts from the heat. If bone be removed, we may skewer the steak or chops into convenient shape and simplify the carving of the former. We add no seasoning until surfaces are seared, as salt both toughens meats and draws out the juices.

The oven must be heated full for 10 minutes before broiling, or meat will simmer instead of broiling. The rack is removed first, so that the steak will not stick to the hot wires and may be properly placed. The red meats (beef, lamb and mutton) are treated in the same manner. I will speak later of the other articles which we broil.

Place the meat about 2 inches from the flame, *always leaving the oven door open while broiling.* This is important, both for the choice flavor of the meat and to prevent burning and smoke. As soon as one side is crisp draw out the pan and turn the steak, then crisp the other side, using two forks to handle meat and thus avoid piercing it. Set the pan farther away from flame to finish cooking and reduce the heat, turning a second time if meat is quite thick. Seasoning may be added after each side is browned. The time required will depend upon thickness of meat, and whether people want it rare, medium or well done; but the method is the same. The intense, direct heat sears the surface so that juices are retained and the flavor is perfected. It is easily digested, most appetizing, and, if rightly done, is pleasing alike to eye and palate. Such results are not obtainable with any other method, and there is no possible comparison between broiling and frying. Now, that we may do this without stooping, we have no excuse for resorting to that foe to digestion, the frying-pan. Even so homely a dish as Hamburg steak takes on new dignity when broiled under the gas flame. It may be lightly seasoned (a little onion juice helps), and if moistened with cream, the dish is a feast. Shape it lightly that it may not be dry, and if cooked in one large flat cake it is better than made into small ones, and more easily handled by inverting on a pie pan.

Dry meats like ham, veal chops, and calves' liver, are first treated to a thin coat of butter, bacon fat, or drippings. Slices of bacon are placed in a flat wire-toaster, so that all may be turned at once. Each piece being evenly cooked, we have a most wholesome result, and are not annoyed by the permeating odors of frying bacon. Broiled bacon is exceptionally easy to digest; it is a form of fat most desirable for delicate people and most welcome to the healthy. Fish and fowl are spread with soft fat, also dredged with flour, salt and pepper before broiling, and a little lemon juice may be added, too. We cook these more slowly than the red meats and baste with hot water and the melting fat. In this way we have juicy, tender meat, surrounded by a delicate crispness.

Chicken will have to be turned after breast is browned lightly and most of the cooking completed before breast is again turned to the fire. A delicious gravy may be made from the stock in the pan below, and we have a dish that easily rivals the popular fried chicken, with none of the handicaps of constant watching or attendant odors. Birds of all sorts are at their best when broiled in this fashion, game being cooked rare. Prompt service on the hot plates, which the careful cook has in readiness, completes the delight of the epicure. It is all

so easy, too. A few of our vegetables can be cooked to perfection in the broiling oven—broiled tomatoes, green peppers and Spanish onions are all simple and excellent—panned apples with sausages are very good in winter time, and cooked potatoes, either white or sweet, are most acceptable if thickly sliced, lightly buttered and grilled to a delicate color. Oysters may be thus cooked in the shell, or on toast, and their individual flavor pleasantly accentuated. You see there is scarcely a limit to our broiling possibilities in the animal kingdom, and we even give some place to the vegetable, too. It is a taste that grows on one and has every argument in its favor.

LETTER NO. 4.—*Roasting.*—Roasting and broiling are practically the same process, the difference being mainly in the cut and weight of meat and time required for cooking. Meat roasted in the gas oven loses less of its weight than when cooked with any other fuel. The ventilated gas oven not only improves flavor but saves money, as meat means money in these days. Roasting will not make tough meat tender, but if fine meat be secured, roasting is a perfect way of preparing it for the table. We pay for tenderness and delicacy in choice meat, and a little of this cost comes back to us in saving of fuel and time. As in broiling, it is desirable that meat be fat; for, even if the fat itself is not eaten, the meat surrounded by it is finer in flavor and food value than if from a poor, lean animal. We select meat by its color, grain and fat. The color should be bright and not purplish when exposed to the air, the grain firm, not flabby, and the fat creamy instead of yellow and oily. If the roast is lacking in fat, we must use an additional quantity in cooking it, but the natural fat is preferable. Place the roast on rack of broiler in lower oven, having previously skewered it into compact shape to facilitate carving. A set of steel skewers, by-the-way, is a very useful thing to own. The wooden ones used by butchers are an abomination, and I always feel sorry for a man trying to carve a piece of meat in which those wooden skewers are placed, for he is sure to be thinking things that it would not be polite to say. The steel ones are easily removed, handy to use, for stuffed meat especially, and will last a lifetime. If you possess these, see that the butcher simply ties the meat for you, then you can manage the rest. The choicest beef roast, however, is the rib roast, with bone left in, cut short and called a standing roast. If roast be small it may be advisable to use a smaller pan than the broiling pan, but in that case a rack should be provided, for meat set on the pan itself practically *fries* on the bottom. A small wire rack is easily obtained and will answer several purposes in the kitchen.

The lower oven is used for all roasting and broiling, the upper oven for baking purposes, both ovens being heated at the same time and with the same flame.

The oven must be heated previous to roasting, the same as for broiling—10 minutes full heat. Turn meat frequently (leaving door open) until each side is seared. Then place roast lower down in the oven, add seasonings and begin basting with the fat which drips into the pan. The oven flame may also be reduced, and as a rule the front burner will do all the work after the preliminary browning of the surface. Red meats so roasted taste more like the old-fashioned roast before an open fire than when cooked in any other manner. Not a drop of water is required for basting if there be a proper amount of fat and the heat be moderate after basting is begun. The roast may be covered with an inverted pan to prevent too rapid cooking, especially if upper oven be in use for quick baking. We allow 15 minutes to the pound for a medium cooked roast. The dry meats, like veal and pork, need almost twice as much time, for they must be thoroughly cooked to be digestible, and water may also be used in basting these. A bit of onion, green pepper, carrot, tomato, celery leaves or root may be used for flavor, and bay leaves, or some of the herbs, give a pleasing change. Dry meat, like calf's liver, may be larded before cooking, or covered with the fat rind from a side of bacon, which enriches and flavors it excellently.

The front oven burner is the one chosen when we use a single burner, and most of our roasting and baking may be accomplished with one burner. It gives as even a distribution of heat as two burners turned down, being also more economical and conveniently regulated. By using the lower oven exclusively for meat cooking, the upper (or baking) oven is free from spattering fat and will be kept clean and ready for use. While the roasting is in process the baking to accompany the meat course is done with the same heat.

Fowl and veal for roasting are first spread with softened fat (butter or meat drippings) and dredged with seasonings and flour. If a stuffing be used it must not be too moist, for the steam inside of the meat will keep it from cooking dry, and if made soft it is both awkward to serve and apt to be soggy. Bread in any state of dryness may be used for dressing with success if it be thoroughly softened in cold water, then drained or squeezed quite dry. With proper seasonings and additional fat, this will produce a light and pleasing adjunct to the roast, quite unlike the pasty dressings hastily made by softening bread with hot water. It seems like a small matter, perhaps, but it makes a world of difference in the result.

If the roast has been cooked at a proper temperature there will be no burned bits in the pan, or scorched fat, and the amount of the latter will probably be greater than we require for the gravy. It is economy to have plenty of gravy, especially if there are children to be considered, and it is quite right, too, for with good gravy they eat more bread and potatoes, also less meat. This gravy or brown sauce is made by cooking the proper proportions of flour and fat together, then diluting same with stock or water, simmering all for 5 minutes, then straining into serving dish.

I use 3 tablespoonfuls of fat with 4 of flour (level measurement) to thicken 2 scant cups of liquid, and a little "Kitchen Bouquet" or browning may be added to give deeper color and flavor. It is easier to make this in a small saucepan than in the large one used for the roast, and it takes less time, even if one considers the additional article to be washed. When I write about oven dinners I will tell you a good way to make a stock for these sauces without extra fuel or attention.

Condensers for Small Central Stations.

[Prepared by MR. HARRY PENNINGTON, for the Southwestern Electrical and Gas Association.]

It is the purpose of this paper to set forth the effect of vacuum on the steam consumption of various types of prime movers, to discuss briefly the elementary facts of condensation, and to describe some recent improvements in condenser apparatus and their effect in securing higher vacuums at lesser cost.

Fuel Saving.—The maximum efficiency possible for any heat engine is determined by dividing the difference between the absolute temperature at which the working fluid is received and the temperature of rejection by the temperature at which the fluid is received, from which it is evident that any lowering of the temperature of rejection greatly increases the efficiency of the heat motor. The curves of Fig. 1 show graphically the theoretical increase in efficiency due

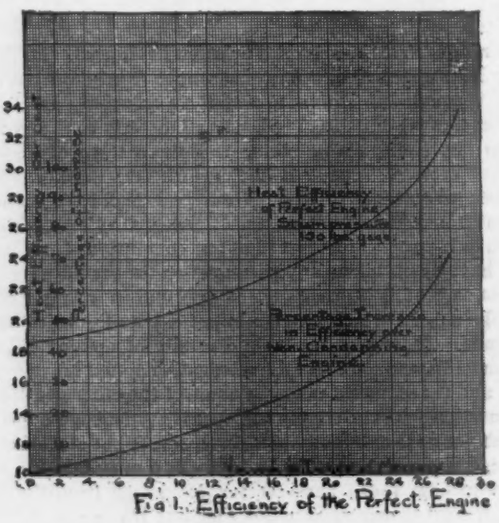


FIG. 1. EFFICIENCY OF THE PERFECT ENGINE

to reducing the exhaust temperature and pressure. It is seen that the higher vacuum employed the greater is the increase, of an ideal engine, for each inch in vacuum. Thus, while at 20-inch vacuum an increase of vacuum to 21 inches adds only 3 per cent. efficiency, the increase in efficiency resulting in increasing the vacuum from 28 to 29 inches is as much as 15 per cent. A glance at a steam table will at once explain this, for, while the drop in temperature of saturated steam from 20 to 21 inches vacuum is only 5° F., the drop from 28 to 29 inches is 22° F.; from another point of view, the pressure multiplied by the increase in volume of a pound of steam from 20 to 21 inches is 286 foot-pounds, while from 18 to 29 inches, it is 1,137 foot-pounds. In the above and throughout this paper, unless otherwise

stated, reference is made to a 30-inch barometer, that is, a 28-inch vacuum means an absolute vapor pressure of 2 inches.

Certain types of prime movers are capable of utilizing low back pressure more than others. We can divide all heat engines working with steam into reciprocating engines and steam turbines. Reciprocating engines can in turn be divided according to the speed, the number and type of valves, and the number of cylinders. The economy to be derived from running condensing any of these various engines will in general depend on the steam saving in each case, the value of steam and the cost of vacuum.

The simple slide-valve engine, subject to great losses due to wire drawing in the valve, large clearance spaces and considerable cylinder condensation, usually consumes from 30 to 50 pounds steam per B.H.P. when running non-condensing, depending upon the type of governor and the load. Even this engine, ill adapted as it is to derive benefits from reduced back pressure, shows considerable improvement. Fig. 2, taken from a test made by Prof. R. C. Carpenter

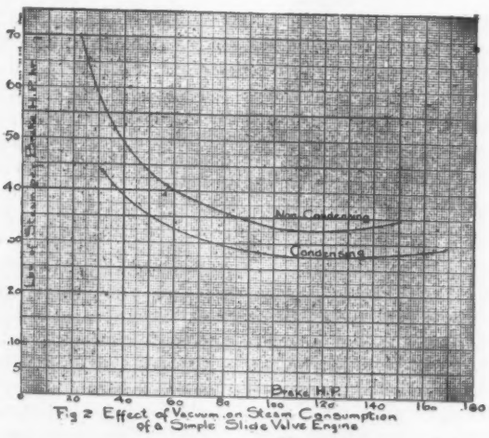


Fig 2 Effect of Vacuum on Steam Consumption of a Simple Slide Valve Engine

on a small slide-valve engine, shows how the use of vacuum increases the steam economy of such an engine.

The single expansion, slow speed, 4-valve engine is more efficient, and the table below shows hows how the economy of this type of engine is affected by the condenser. Roughly speaking, the steam consumption is reduced 25 per cent.

TABLE I.—*Steam Consumption of Single Cylinder, Four-Valve Engines.—Gebhardt's "Steam Power Plant Engineering."*

Type.	Non-Condensing.	I.H.P.	Lbs. St. I.H.P. Hr.
Corliss, jacketed....	Peabody, Thermodynamics.	237.0	21.5
Fleming.....	Prof. Carpenter, June 28, 1905, Cornell University.	217.9	22.46
Fleming	Prof. Spangler, June 6, 1905, Univ. of Penn.	132.0	22.24
Corliss.	Peabody, Thermodynamics.	120.0	23.9
Corliss	Barrus, Engine Tests, p. 47.	506.0	25.8
Corliss	Barrus, Engine Tests, p. 126.	342.0	25.9
	Condensing.		
Corliss, jacketed...	Peabody, Thermodynamics.	155.0	16.5
Poppet valves, jacketed..	Zeit. D. V. D. Ing., Aug. 1905, p. 1310.	262.0	15.0
Gridiron valves....	Barrus, Engine Tests, p. 101.	613.0	18.5
Corliss.	Barrus, Engine Tests, p. 118.	554.0	19.45
Slide valve.....	Barrus, Engine Tests, p. 88.	213.0	22.0
Corliss	Peabody, Thermodynamics.	145.0	19.4

The compound engine with Corliss valves is of more general importance. The economy of using condensers with this type of engine is much greater than with simple engines. This arises from the fact that the exhaust valves open more widely, that there is a lower range of temperature, hence less condensation in each cylinder, and also because the ratio of expansion can be made greater. The results of a number of tests of compound engines, as reported in the various technical papers and proceedings, are given in the following tables. The steam per horse power hour decreases with the increasing size of the engine. Likewise, the economy derived from condensing apparatus increases as the engine size increases.

Turning now to the steam turbine, we find that this type of heat motor, owing to the greater ratio of expansion and the fact that there is no alternate heating and cooling of metal surfaces to cause condensation within the turbine, derives the greatest benefit from condensing apparatus. In the turbine the steam is allowed to expand completely to condenser pressure while doing work. The increase in economy of a 300-kw. Parsons turbine with increase in economy amounts to 40 per cent., corresponding to a reduction in steam consumption from 34.1 pounds to 21 pounds per kw. hour.

TABLE II.—*Steam Consumption of Compound Engines.—Ibid.*

Type.	References.	I. H. P.	Lbs. St. I.H.P. Hr.
	Non-condensing.		
Willans..... .	Peabody, Thermodynamics.	39.6	19.2
Willans..... ...	Peabody, Thermodynamics.	33.0	21.4
Ball, Chicago Public Library	Eng. Record, Aug. 6, 1908.	187.5	21.14
West'house Marine.	Power, Aug., 1903.	540.0	19.3
Skinner, cross comp.	Power, July, 1906.	375.0	21.14
Buffalo, tand. comp.	Elec. World, May 23, 1903.	121.0	22.3
Reeves, vert. cross comp..... ..	Eng. Record, July 1, 1905.	185.0	20.9
Cross comp. 4-slide valves.....	Barrus Engine Tests, p. 181.	486.7	21.59
4 Cylinder comp. locomotive No. 2512, Penn. system.....	Tests made at Louisiana Exp. 1904.	495.0	18.6
	Condensing.		
Cross comp. Corliss, Atlantic Mills, Prov.	Amn. Elec., June, 1903.	500.0	11.20
Leavitt pumping engine, Louisville, Ky.	Trans. A. S. M. E., Vol. 16, p. 169.	648.0	12.20
Rice & Sargent Corliss, Am. Sug. Refinery, Bklyn. ...	Trans. A. S. M. E., Vol. 24, p. 1274.	627.0	12.10
Fleming 4-valve....	Trans. A.S.M.E., Vol. 25, p. 212.	348.0	12.13
Williams vertical, N. Y. Navy Yard.	Power, Oct., 1903, p. 583.	340.0	12.60

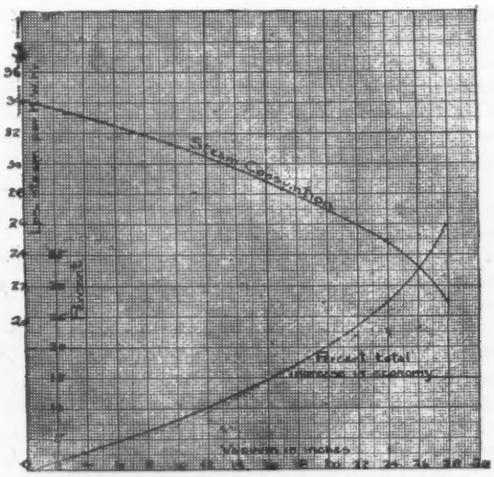


Fig 3. Effect of Vacuum on Steam Consumption of a 300 K.W. Parsons Turbine.

Fig. 4 shows the effect of vacuum upon the steam consumption of a DeLaval turbine of 300 k.w. capacity, operating at full load with saturated steam at 150 pounds gauge.

Other Economies of Condensing.—The lessened steam consumption, due to operating under reduced back pressure, is not the only important advantage to be derived from running condensing. Besides the saving in steam, which represents a coal saving, there is the increase in the capacity of the plant to be considered. With the same boiler equipment we can obtain more power per pound of steam when running condensing than when running non-condensing. Let us assume for instance that a given equipment of boilers, engines, buildings, etc., cost $100 per horse power, and that the size of the plant is 500-horse power. By installing a condenser, the capacity of the plant could be readily increased to 625-horse power, reducing the cost per horse power, excluding for the present the cost of the condenser, to $\frac{500 \times 100}{625} = \$80$. Thus, there would be warranted an expenditure of about $20 per horse power for the condensers. This is many times the cost of a highly efficient surface condenser.

Principles of Condensation.—The condensation of steam can, for our present purpose, be considered a very simple process. A pound

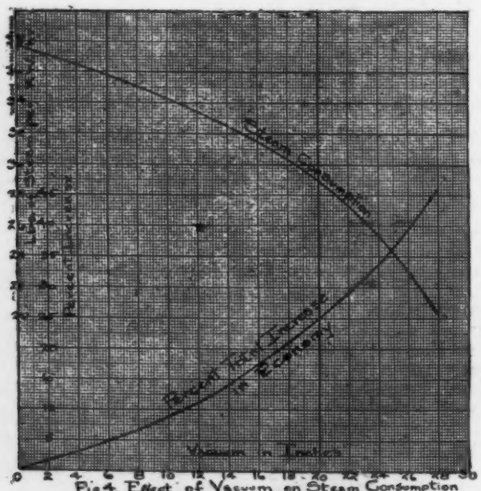


Fig. 4. Effect of Vacuum on Steam Consumption of a 300 K.W. De Laval Turbine

of steam, at a pressure of 1½ inches absolute, corresponding practically to 3 inches of mercury or 27 inches vacuum, referred to a 30-inch barometer, will occupy, as may be found in the steam tables, a volume of 231.8 cubic feet, and will have a temperature of 115° F. If the steam is saturated (that is, in contact with water), the temperature will remain the same so long as the pressure remains unchanged.

If this steam pressure is maintained within a condenser that is receiving steam constantly from an engine or turbine, a volume and weight of steam must be condensed during each minute equal to the rate of inflow, otherwise the pressure and temperature of the steam within the condenser will be raised by compression. Now, to condense 1 pound of steam at the pressure and temperature given, requires the abstraction of 1,027 B.T.U., the latent heat of the steam under these conditions.

As a pound of water will absorb 1 thermal unit when its temperature is raised 1° F., 51.4 pounds of water, raised through a range of 20° F. of temperature, will, therefore, be required for each pound of steam condensed. Similarly, 34.2 pounds raised 30° F., 25.7 pounds raised 40° F., or 20.5 pounds raised 50° F., may be used to perform the same duty. The temperature at which cooling or circulating water is received is usually fixed by the conditions and surroundings of the power plant. The temperature to which the water can be raised is limited by the temperature of the steam, and a perfect condenser would heat the circulating water to this temperature and would require the theoretically minimum amount. Practically, however, there must be some difference in temperature between the steam and the water in order that the heat may flow from the steam to the water, as through the metal tubes of a surface condenser. In a jet condenser, where the steam comes into immediate actual contact with the water, conditions are different, and if thorough intermixture is secured, the temperature of the water may be brought very close indeed to that of the steam.

Under the simple conditions above assumed, and assuming a perfect condenser, the vacuum is determined solely by the temperature and amount of cooling water available. That is, if the amount of cooling water is so limited that it must be heated to 120° F. in order to absorb all the heat of the steam, the best possible vacuum would be 26.56 inches. If there is sufficient cooling water to absorb all the heat with a rise of temperature to 110° F., the best obtainable vacuum would be 27.41 inches; similarly for 100°, 28.07 inches; and for 90°, 28.58 inches; for 80°, 28.97 inches; for 70°, 29.26 inches, and for 60°, 29.48 inches. A condenser based on these facts would consist, then, only of means of circulating the cooling water, of bringing the steam and water together, and of removing the water resulting from the condensation of the steam. In practice, however, the problem is much complicated by the entrance of another element, namely, air; and it is the influence of air in the condenser that proves a stumbling block to many who attempt to understand the workings of a condenser.

The important fact to be kept in mind is Dalton's Law of mixed vapors, which may be stated in this wise: "A constant weight of gas maintained at a constant temperature confined in a vessel of constant volume exerts the same pressure upon the walls of that vessel regardless and independently of any other gas or vapor present or introduced into the vessel."

Air and water vapor in a condenser obey this law of mixed gases. That is, if the temperature of the condenser is 101.5° F., the pressure due to the water vapor in that condenser is exactly 1 pound per square inch. The total pressure in the condenser may be something quite different, as 1½ pounds per square inch, in which case the additional ½ pound must be due to the presence of some other vapor or gas, such as air.

The amount of air present is easily calculated from Boyle's and Mariotte's Laws; namely, that at constant temperature the pressure of the gas varied inversely as its volume, and that at constant volume the pressure varies directly as the temperature measured from the absolute zero, namely, 463° F. Combining the two laws we have the formula: P. V. R. T., in which if P is pounds per square inch, V cubic feet per pound of gas and T absolute degrees temperature Fahrenheit, the constant R will be equal to 37.

With this explanation, let us return to the consideration of what goes on in the condenser. At the inlet opening we have a constant inflow of practically pure water vapor with only a very small, almost negligible percentage of air. This vapor, upon striking the cold circulating water, rapidly condenses, becoming richer in air until, at the extreme farthest part of the condenser, we have a mixture of which air constitutes an important part. How much water vapor and how much air there will be in 1 cubic foot of the mixture at this farthest point, which should be the location of the air pump suction, we can determine if we know the total pressure in the condenser and the temperature at the air pump suction. The pressure is practically uniform throughout the condenser. Let us suppose that it is 1½ pounds per square inch, as assumed above, then the temperature at the inlet, where there is practically pure water vapor, will be 115° F. Assume that the temperature of the mixture at the air pump suction is 60° F. From the steam table we readily determine the weight of a cubic foot of steam at 60° F., .000828 pound, and the pressure corresponding to 60° F., or ¼ pound. Subtracting this from 1½ pounds, the total pressure, we get the partial pressure of the air, and knowing its temperature and volume we obtain its weight. As a cubic foot of air at 60° F. and 14.7 pounds per square inch pressure weighs .076 pound, we can calculate, by means of the above formula, that each cubic foot of the mixture will then contain .00645 pound of air, and it will be seen that the air pump capacity required is determined solely by the number of pounds of air entering the condenser per minute, and the temperature and pressure at which the mixture is withdrawn. The relations between these quantities are shown graphically in Fig. 5. As will be seen, a high vacuum is impossible

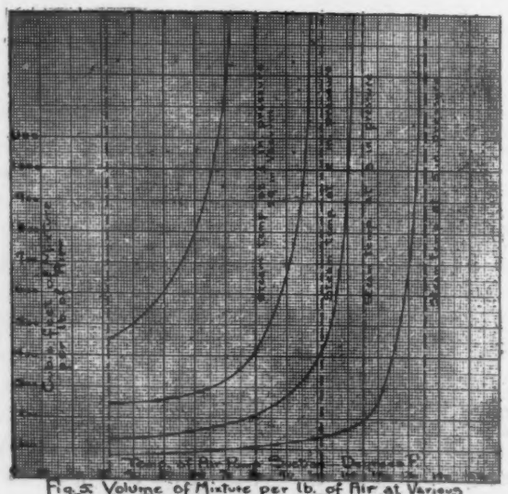


Fig. 5. Volume of Mixture per lb. of Air at Various Suction Temperatures and Different Total Condenser Pressures

without a cold air pump suction and a hot air pump necessarily implies a low vacuum. The bearing of these facts upon condenser design will be brought out more fully later on. To recapitulate, we need, in order to obtain hight vacuum, the following:

1. Sufficient cooling water to abstract the latent heat of the steam.
2. Such construction of the condenser as will insure ready transmission of heat from steam to water and full utilization of all the water.
3. The withdrawal of the air where it it is coldest and where the proportion of air to steam is greatest.
4. Sufficient air pump displacement to dispose of the mixture of air and uncondensed vapor.

Recent Improvements in Condensers and their Effect on Vacuum.—In general there are two classes of condensers, the jet condenser, under which heading may also be classed siphon and barometric condensers, wherein the steam and the cooling water come into actual contact, and the surface condenser, wherein the steam and water are separated by metallic tube surfaces. If the cooling water is not suitable for boiler feeding, and if fresh boiler water is expensive, the surface condenser is to be preferred, since it returns the condensed steam as pure distilled water, which can be fed back into the boilers.

Jet Condensers.—Heretofore the great trouble with jet condensers has been that the steam was not brought into thorough intermixture with the water and that efficient means were not provided for cooling the air. In this connection it should noted that the amount of air to be handled in the case of a jet condenser is greater than with a surface condenser, due to the air introduced in solution in the circulating water. This supplies an added incentive for keeping down the volume of the latter as much as possible. Reference to Fig. 6, which illustrates the old type of jet condenser, shows why it is difficult to obtain good vacuums economically with this apparatus. In the first place the steam can come into contact with the water for a moment only, and consequently does not heat every particle to steam temperature, so that at any vacuum the full cooling capacity of the water is not utilized, larger quantities of water are used than are absolutely necessary, and more work is required of the circulating pump than if the final temperature of the water had been higher. In the next place, the manner of withdrawing the air and uncondensed vapors is such that their temperature is not the very lowest, and the proportion of air to steam is not the maximum, hence the ability of the air pump to produce a good vacuum is curtailed. As will be seen in the picture referred to, there has been an attempt made to further condense the water vapor going to the air pump by the use of an auxiliary surface condenser, whose purpose is to decrease the volume of water vapor by condensation and of the air by further cooling. Such a device has only a limited effect, for the reason that, in order to transmit heat rapidly to water within tubes from air without, it is necessary to have considerable difference in temperature between the hot and cold fluids, so as to supply the heat pressure or head. With this little condenser, therefore, the vapor and air are not reduced in temperature to any extent. The auxiliary cooler thus adds not only to expense but complication to the apparatus. A test carried out recently in a railroad and lighting central station, where a steam turbine exhausted into a condenser of this type, shows wherein these faults affect the economy of the condensing apparatus. Fig. 7 is a graphical log, drawn from the figures obtained, which are also given below:

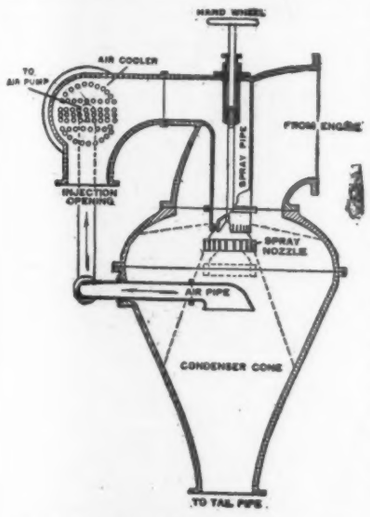


Fig. 6.—Sectional View of the Ordinary Jet Condenser.

Test of Old Style Jet Condensing Outfit.

Time March 10th, 1910.	Vacuum Charge.	Barometer.	Corrected Vacuum Referred to 30-Inch Barometer.	Steam Temperature Corresponding to Vacuum.	Temperature of Inlet Water.	Temperature of Outlet Water.	Vacuum Corresponding to Discharge Water Temperature.
6.05	27.0″	29.36″	27.64″	107°	54°	88.0°	28.67″
10	26.7	"	27.34	111	54	91.0	28.54
15	27. (?)	"	. ...	...	54	94.0	28.40
20	26.4	"	27.04	114	54	96.0	28.28
25	26.5	"	27.14	113	54	97.0	28.24
30	26.4	"	27.04	114	54	96.0	28.29
35	26.2	"	26.84	117	54	98.5	28.19
40	25.5	"	26.14	124	54	106.0	27.70
45	25.7	"	26.34	122	54	104.0	27.83
50	25 9	"	26.54	120	54	105.0	27.76
55	26.0	"	26.64	119	54	102.0	27.96
7.00	26.2	"	26.84	117	54	99.0	28.13
05	25.7	"	26.34	122	53	102.0	27.96
10	25.6	"	26.24	123	51	104.0	27.83
15	25.8	"	26.44	121	54	104.0	27.83
20	26.0	"	26.64	119	54	105.0	27.76
25	26.7	"	27.34	111	54	105.0	27.76
30	26.2	"	26.84	117	54	101.0	28.02
35	25.8	"	26.44	121	54	105.0	27.83
40	25.2	"	25.84	127	54	106.0	27.70
45	25.0	"	25.64	129	54	107.0	27.63
50	25.5	"	26.14	124	54	108.0	27.56
55	25.5	"	26.14	124	54	104.0	27.83
8.00	25.4	"	26.04	125	54	100.0	28.07

Reference to the log previously presented will show clearly how inefficient the condenser is in utilizing to the utmost the cooling capacity of the water. The circulating water enters at a constant temperature of 54° F., and is raised in the condenser to an average temperature of about 100° F., leaving while still 15° to 25° colder than the temperature corresponding to the vacuum.

Turning now to a test carried on simultaneously in the same plant, with another turbine exhausting into a different type of jet condenser, we see not only that the vacuum is considerably higher but that the temperatures of exhaust steam and of the discharged cooling water are almost identical. The data for this test are given below, and in Fig. 8 the temperatures and vacuums are shown graphically.

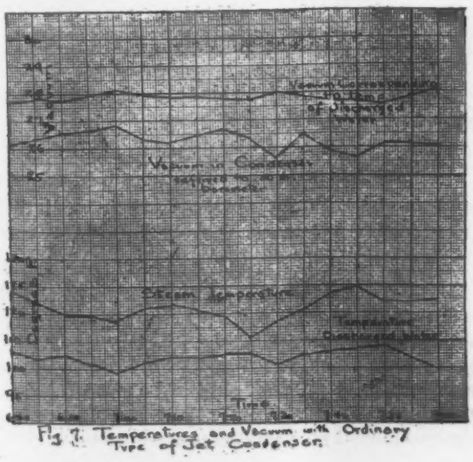


Fig. 7. Temperatures and Vacuum with Ordinary Type of Jet Condenser.

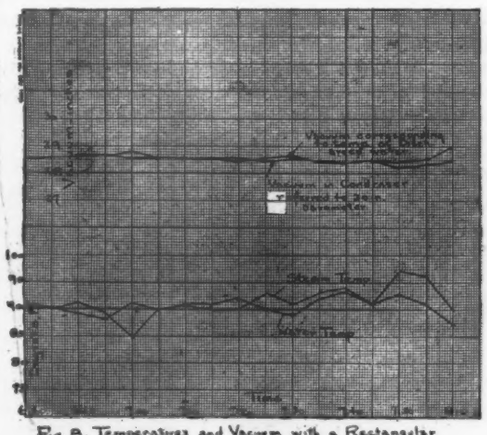


Fig. 8. Temperatures and Vacuum with a Rectangular Jet Condenser.

The cooling capacity of the water has been used to the utmost extent, the very highest vacuum being obtained for the amount and temperature of the water available. The higher vacuum means a saving of about 5 per cent. in steam consumption of the main turbine, and is obtained with less work on the part of the circulating pump

A closer inspection of the figure will show a rather startling condition. For instance, at the time 6:50, it is noticed that the temperature of the steam is about 2° lower than the temperature of the water which is cooling it. It is, of course, absurd to state that water that is warmer than the steam can abstract heat from it, and the apparent contradiction is undoubtedly due to the lag of the thermometer. It is to be noticed, too, that the load on the machine was varying quite rapidly, with sudden peaks. Nevertheless, soon after the load had

increased the condenser was able to give a high vacuum regardless of the variation in load.

Test of Rectangular Jet Condenser Outfit.

Time Mar. 9th 1910.	Vacuum Gauge.	Barometer.	Corrected Vacuum Referred to 30-in. Barometer.	Steam Temperature Corresponding to Vacuum.	Temperature of Inlet Water.	Temperature of Outlet Water.	Vacuum Corresponding to Discharge Water Temperature.
6.05	27.70″	29.26″	28.44″	93°	51.5°	76.0°	29.1″
10	27.95	....	28.69	87	51.5	78.0	29.04
15	27.80	29.27	28.53	91	51.0	78.5	29.02
20	27.90	29.28	28.12	89	51.0	81.0	28.94
25	27.00	29.28	28.72	87	51.0	82.0	28.9
30	27.90	29.28	28.62	89	51.0	81.0	28.94
35	27.90	29.28	28.62	89	51.0	82.0	28.9
40	27.80	29.28	28.52	91	51.0	90 5	28 56
45	27.85	29.28	28.57	90	51.0	90.0	28.58
50	27.90	29.28	28.62	89	51.0	91.0	28.54
55	27.95	29.28	28.67	88	51.0	89.5	28.63
7.00	27.80	29.28	28.52	91	51.0	85.0	28.79
05	27.85	29.28	28.57	90	51 0	90.0	28.58
10	27.80	29.29	28.51	91	51.0	91.0	28.54
15	27.85	29.29	28.56	90	51.0	91.0	28 54
20	27.85	29.29	28.57	90	51.0	92.0	28.49
25	27.70	29.29	28.42	93	51.0	90.0	28.58
30	27.80	29.29	28.52	91	51.0	89.0	28.63
35	27.70	29.29	28.42	93	51.0	92.0	28.49
40	27.65	29.29	28 37	94	51.0	93.5	28.42
45	27.80	29.29	28.51	91	51.0	92.0	28.49
50	27 50	29.29	28.21	97	51.0	93.0	28.44
55	27.60	29.29	28.31	96	51.0	91.0	28.54
8.00	27.85	29.29	28.55	90	51.0	87.0	28.91

The curve of recorded vacuum and that corresponding to the temperature of the cooling water are practically identical, showing that for the water conditions the greatest possible vacuum is obtained. So close are the two curves that we must conclude the air removal is very effective and that the cooling capacity of the water is completely used. The high temperature of the discharge water from this condenser has a very important bearing upon the work of the circulating pump. As can be seen from the data the average temperature of the entering circulating water was 51° F., and the rise in temperature was 40°. Dividing this into the heat per pound of steam, assuming 90 per cent. quality, we see that only about 23 pounds of water per pound of steam were required. This small amount of cooling water means a minimum amount of air introduced into the condenser shell, hence likewise the smallest amount of air to be removed by the vacuum pump.

At the same time the discharged, uncondensed vapor and air were at their lowest temperature and density. Reference to the cross section of this condenser, in Fig. 9, will show the path of the steam and

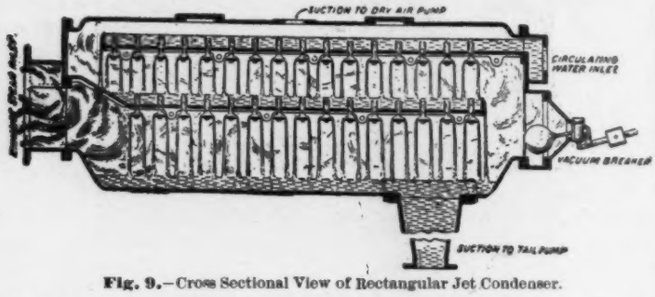


Fig. 9.—Cross Sectional View of Rectangular Jet Condenser.

air through the condenser; the entering steam and air meet the water falling from the lower trays; that is, the hottest steam meets the hottest water, completely utilizing its heat absorbing capacity, while the remaining uncondensed steam and air sweep on through a continually reducing cross section, which prevents air pocketing and return of the air, rising to the upper section and passing back again to the left, where they meet the very coldest entering water. Comparatively no temperature head is required for the transmission of heat under conditions of actual contact, and the gases going to the air pump are at the greatest density, low in temperature, rich in air and poor in steam vapor.

As the mixture of air and water vapor handled by a vacuum pump is very rare, especially for high vacuums, the design of the air pump requires special attention. The ratio of compression is so great (15 volumes for a 28-inch vacuum) that any small amount of clearance has a large effect on the volumetric efficiency. With ordinary clearance the piston may sweep out as much as half-way on its suction stroke before the pressure is reduced from atmospheric or discharge, pressure, down to the pressure in the condenser, and before new air can flow into the cylinder. Of course, the less the clearance the greater will be the volumetric efficiency, but it is evident that, when handling such rare material as enters a vacuum pump, the smallest possible mechanical clearance cannot give high efficiency. To overcome this difficulty, some air pumps are compounded, in order to reduce the ratio of compression per cylinder, on the same principle as air compressors. However, so much friction is introduced by this procedure, and so much is added to the cost of the apparatus, that it becomes doubtful if the added advantage is worth the cost.

The air pump used with jet condensers is of the rotative, dry-vacuum type. As shown in the cross section in Fig. 10, this pump is

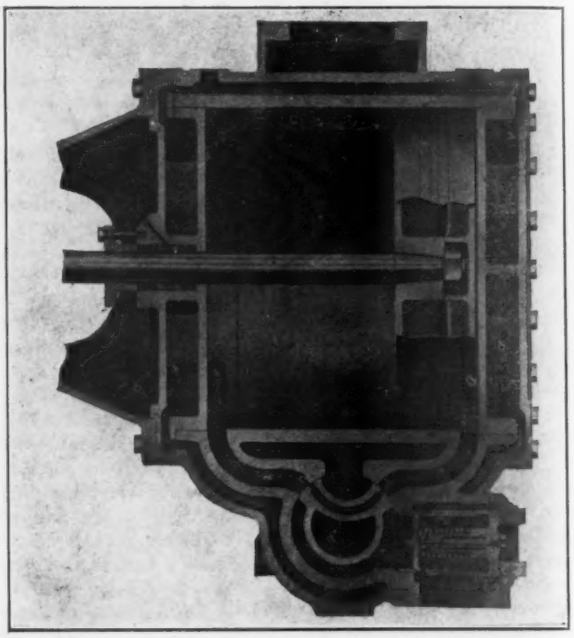


Fig. 10.—Cross Section of Air Cylinder of Rotative Dry Vacuum Pump.

a single-stage machine; but, in addition to the ordinary poppet outlet valves, is fitted with a positive move, semi-rotative valve, more or less similar to a Corliss valve and having a peculiar function. In the illustration the piston is shown at the end of its stroke. It will be seen that the rotative valve is in such a position that the two ends of the cylinder are momentarily in communication. By this means the pressure in the clearance, which just a moment before was somewhat greater than 14.7 pounds, is immediately reduced to the pressure on the vacuum side of the piston, so that when the piston starts on its outward stroke it at once draws in air from the condenser. The efficiency of this device is most clearly shown by the indicator card in Fig. 11. Instead of an adiabatic expansion of gases within the clear-

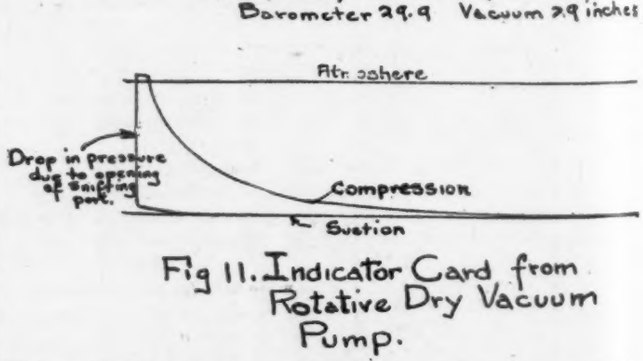

Rotative Dry Vacuum Pump 30 x 18
Barometer 29.9 Vacuum 29 inches
Atmosphere
Drop in pressure due to opening of suction port.
Compression
Suction

Fig 11. Indicator Card from Rotative Dry Vacuum Pump.

ance space there is seen a straight drop in pressure, and, as the stroke begins, air is immediately drawn into the cylinder. Thus the volumetric efficiency, instead of being in the neighborhood of 50 per cent., is about 90 per cent. The use of this dry air pump permits of obtaining very high vacuums in the condenser at a reasonable cost. In fact,

by the use of an efficient dry air pump of this type, with a jet condenser, vacuums as high or higher than those obtained with surface condensers can in general be obtained. This is of the utmost importance in steam turbine work, where every inch of vacuum is highly desirable.

Surface Condensers.—Turning now to the surface condenser, we find that improvements have been made in this device which are equally valuable in increasing the economy of the prime mover without adding greatly to the expense of auxiliary apparatus. While we do not have here the trouble created in the jet condenser, by the introduction of large quantities of air with the injection water, there are other difficulties due to the fact that heat must be transmitted through metallic tubes. Investigations have shown that transmission of heat through condenser tube surface is affected by the following factors, among others:

1. The velocity of the circulating water through the tube.
2. The material, thickness and cleanliness of the tube.
3. Velocity of steam against the tube.
4. The percentage of air in the steam surrounding the tube.
5. Whether or not the steam side of the tube is flooded with water.

Increase in velocity of water means rapid increase in the power required by the circulating pump, and the point is shortly reached where the increase in efficiency of the tube surface is offset by the loss of power in the circulating pump. The resistance encountered by the circulating water increases only as the square root of the velocity Hence the power required to pump the water will increase as the 6th power of the coefficient of heat transmission, where the latter is increased solely by raising the velocity of the water. The material of condenser tubes has relatively little bearing on the transmission of heat through them and is determined by other considerations.

The velocity of the steam against a condenser tube depends upon the size of the condenser shell and the method of baffling and implies drop in pressure between the prime mover and the condensing surface. This at once limits the use of high steam velocities, since they would necessitate uneconomical back pressures and inefficient turbines.

The two most important factors in surface condensers are the conditions existing with regard to air and water. The presence of air in a condenser shell is inevitable, and, as we have already seen, has a great effect upon the vacuum obtained. The lower portion of a surface condenser will contain the mixture richest in air, due both to the fact that the mixture is heavier than pure water vapor at the same temperature and to the effect of the incoming steam in driving the mixture down ahead of it. The air pump suction should, therefore, be placed in the lower part of the condenser shell. Air has a very low thermal conductivity. Hence, if the tubes of a condenser are surrounded by air, they will not be as effectual in abstracting heat from the steam as they would if less air were present and the air pump capacity were sufficient to prevent "air drowning" of the tubes.

It has been found by experiment that the steam entering an ordinary surface condenser is for the greater part condensed by the upper rows of tubes and that the condensate falls down over the lower tubes in a veritable flood. This is highly detrimental in that it blankets the tubes, preventing steam from coming into contact with them, and also because heat is uselessly abstracted from the condensed steam by the cooling water. Thus the cooling capacity of the circulating water is uselessly wasted.

The modern tendency is to get the water of condensation to the pumps by the most direct route without falling down over the tubes. These improvements are being made every day and tend to increase the efficiency mechanically as well as commercially.

The air pump used for such condensers is sometimes the wet vacuum type, in which both the water and air of condensation are handled by one pump. In such wet vacuum pumps the regular daily records show that the vacuum stands at 28½ inches of mercury over long periods.

This would not have been possible were not the working of the air pump perfect. Usually surface condensers, to obtain such good vacuums as this, are equipped with separate dry air pumps, thus necessitating not only a greater first cost for the installation of the machine, but also more power for operation. Withdrawing the air and water of condensation in one cylinder also insures a cool air pump without water jackets.

Arrangement of Plants.—The arrangement of condensing plants is a study requiring some extsnsive knowledge of condenser practice.

In general, long exhaust lines, under vacuum, ells and pockets should be studiously avoided. The existence of defects in vacuum lines often reduces the high vacuum required at the outlet of the turbine or engine. In Fig. 12 is seen an arrangement, being most

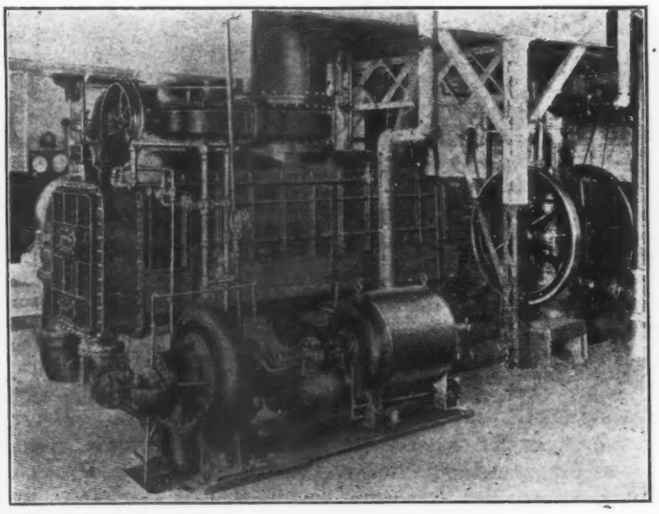


Fig. 12.

economical in floor space and obtaining the best results from running condensing.

Often plants cannot be located with reference to cooling water for condensing, but more with reference to the center of distribution. The absence of cooling water, however, is not a bar to obtaining the economies of condensing plants. This naturally brings us to the subject of means for cooling water in large quantities and in an efficient manner.

Cooling Towers.—With any type of condenser thorough heat transmission, from steam to cooling water, not only permits of economical high vacuums, but reacts upon the capacity of the cooling tower if one is used. Cooling towers discharge heat in the form of latent heat of evaporation. The amount of evaporation depends upon the thoroughness with which the water is brought into contact with the air and the temperature to which the air and water vapor is heated. Now the absolute humidity of the atmosphere limits the temperature to which water can be cooled by evaporation. If the vapor pressure is such that the temperature corresponding to it is only 70° F., this would be the limit to which a cooling tower could reduce the temperature of the water. Depending upon the effectiveness of the tower in removing water vapor, and in supplying large surface of contact

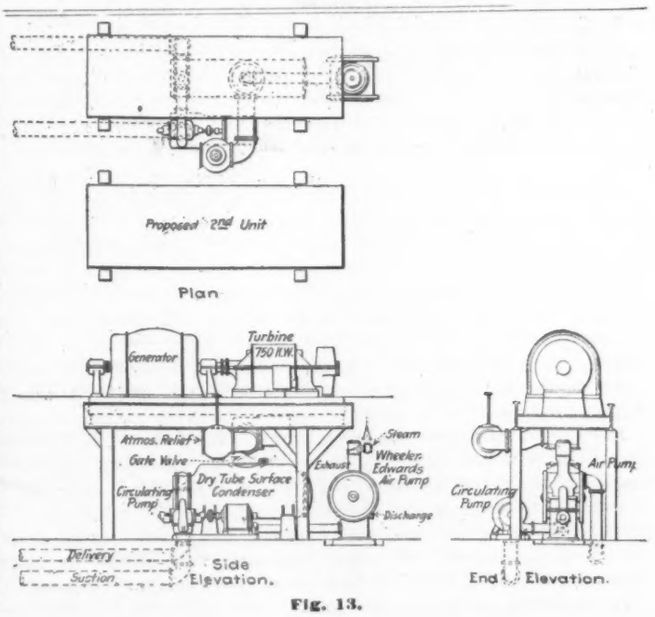


Fig. 13.

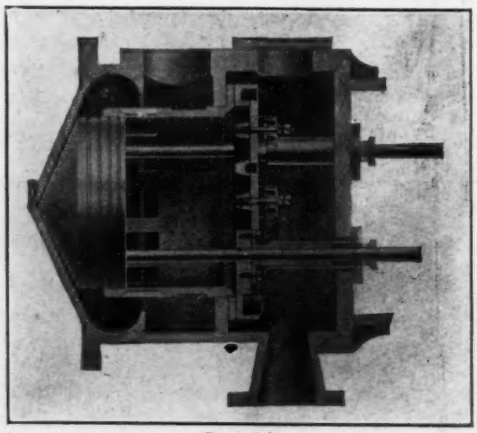


Fig. 14.

air and water, this temperature will be approached; but it is still highly important that the condenser be able to give the highest vacuum compatible with the available temperature of the water.

Also, the higher the temperature of the water entering the tower the more effectively can the tower discharge its heat, so that a condenser which obtains a high vacuum and at the same time heats the cooling water to the greatest degree will necessitate the smallest cooling tower and least expenditure of fan power. Inversely, a cooling tower which cools its water the nearest to the vapor temperature (or the temperature of the wet bulb thermometer) enables the condenser to obtain the best vacuums, reduces the temperature of the uncondensed vapors and gases going to the vacuum pumps, and thus reduces the expenditure of power for the condenser auxiliaries. The vacuum on the exhaust of the prime mover becomes dependent accordingly on the efficiency of heat transmission from steam in the exhaust pipe to steam or water vapor in the atmosphere, and as this involves a number of temperature steps, each must be made as small as possible, so that, for given conditions, the temperature of exhaust steam will be the lowest and the vacuum the highest consistent with the final temperature of heat disposal.

The cooling tower solves many condensing problems. In a non-condensing plant the exhaust steam is wasted to the atmosphere, and thus the water, which under such conditions is usually scarce, is all lost; but, with a cooling tower and condenser, such water is recovered with a slight loss, and is again available for the heat cycle.

Graphic Analysis of Financial and Operating Reports of a Gas Company.

[Prepared by Mr. J. P. Duke for the Southern Gas Association.]

In the careful analysis of both financial and operating reports of gas companies it has been found that the greatest help, to a clear understanding of the relations of the various figures, is to plot these figures and ratios to an appropriate scale and thus present a vivid picture of the past performance of the company, and also by projecting these lines to get an idea of what can probably be expected in the future.

Especially is this matter of graphically showing the condition of a public service corporation necessary in the large combinations of gas and electric properties, where it would be well nigh impossible for an executive, having control of many different properties, to obtain the imformation he desires by trying to arrange logically in his mind columns upon columns of figures. It is also necessary for the local operating man to know from day-to-day and from month-to month, exactly what the property under his control is doing and there is no quicker, surer, and at the same time, easier method than that of "graphical analysis."

In order to bring out certain advantages, and to show how clearly certain figures can be presented, I have in Fig. 1, plotted curves showing the "Gross Income," "Operating Expenses," "Net Earnings" and "Ratio of Operating Expenses to Gross Income," of a hypothetical gas company, and have so drawn these curves as to bring out certain facts that would be of greatest interest to the man operating this "Hypothetical Gas Company."

If we plotted the actual income, operating expenses and earnings

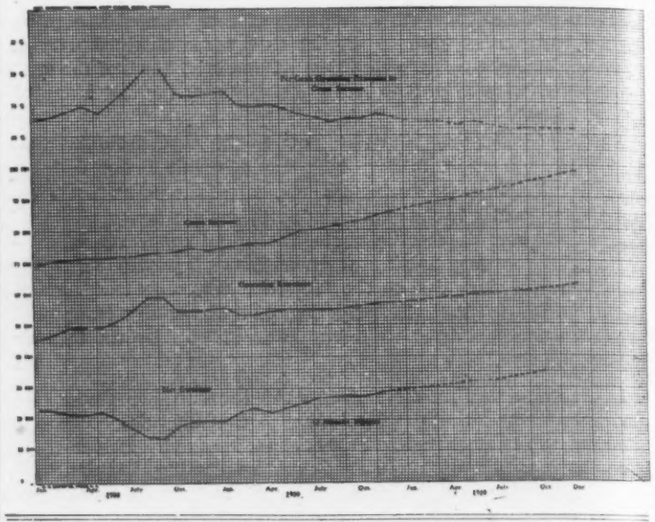


Fig 1.

in dollars and cents for each month, it would make such an irregular curve that little could be learned from it, but if we use "12-months' figures" we obtain a comparatively regular curve, and one that is extremely useful, especially in estimating what should be the future performance of the company. By "twelve months' figures" we mean the total of the preceding 12 months ending with the particular month in question. For example, the amount plotted for "Gross Income," January, 1908, is the total income for 12 months, ending with January, 1908. For the February, 1908, figures we add the amount of the income for February, 1908, to the January, 1908, total 12 months' figures, and subtract from it the income for February, 1907, and so on with the remaining months.

An inspection of these curves will show at a glance that the income for 1908, although it increased some, did not increase near so rapidly as it did in 1909. Operating expenses increased out of all proportions to income during 1908, especially from June to September, but began with October to come down to a normal figure. Net earnings fell off practically from January, 1908, to September, 1908, but during 1909 showed a steady and regular increase. All this, of course, could be found out by taking the financial reports month-by-month, going through them carefully and laboriously; but when the same figures are plotted to scale, these facts, that it would have taken hours and days to ascertain from financial reports, are shown almost instantaneously by the curves.

At the end of the year 1909 we naturally wish to know what we expect to do in the next year, 1910. I have projected the curves for "Income," "Operating Expenses" and "Net Earnings" for the year 1910, and we will assume that this represents what is expected of the company for this year. You will notice that the "estimated figures" are dotted. Then, as the actual figures are obtained, month-by-month and plotted, the relation between the "actual" curve and "estimated" curve will show whether the company is "living up to its estimates" or falling behind.

The illustration might be called the "total" of all accounts. Now to discover the reason for any unusual variations in these curves, it is necessary to refer to the curves that show those numerous items that go to make up "Income" and "Operating Expenses." If we refer to our curves showing the "cost per 1,000 cubic feet" for "Manufacture," "Distribution" and "General Expenses" we will see to which department to look for the unusual expenses from June to September, 1908. The curves of the different accounts that go to make up "Cost of Manufacture," for instance, will show whether the increased cost was due to an increase in the costs of labor, materials, or coal, or to unusual amounts spent for maintenance or to a general falling off in operating results.

To give an idea as to the general character of the curves that would be useful for almost any gas company to keep, I might mention, among others, the following: Those relating to manufacture, such as "Gross Cost of Manufacture—Operating," "Net Cost of Manufacture—Operating," "Value of Residuals," "Gas Coal," "Manufacturing Labor," "Cost of Handling Residuals," "Total Maintenance of Works," "Total Cost of Manufacture," etc.

A set of curves dealing with maintenance, such as "Maintenance of Bhildings and Fixtures," "Maintenance of Steam Plant," "Main-

tenance of Gas Apparatus," "Maintenance of Services," "Maintenance of Meters," "Maintenance of Mains," "Maintenance of Mains per Mile," and "Total Maintenance." These figures could either be plotted as "Cost per 1,000 Made," "Monthly Figures," "Twelve Months' Figures," or all of them, if found profitable.

The superintendent of works would like such curves kept as yield per pound, per cent. of coke made to coal carbonized, per cent. of coke used under retorts, gallons of tar made per ton of coal carbonized, candles per gallon, candle feet, make per retort, etc. These ratios should be plotted day by day as well as month by month.

The new business department would find it profitable to plot such curves, as number of consumers gained, number of ranges installed, number of water heaters installed, number of arcs installed, amount spent for newspaper advertising, amount spent for canvassing, income per mile of main, income per consumer, income per 1,000 cubic feet sold, number of consumers per mile of main, etc. If such curves as these were plotted month by month, the new business man would have constantly before him as good an idea of the performance of his department as the superintendent of works has of his.

I might go on and give examples of the use of curves in every department, but the foregoing are amply sufficient to show the adaptability of graphics to all problems. The number of curves it is desirable to plot is determined by individual needs and conditions. The company by which I am employed, and which is one of the very smallest represented in this Association, keeps a set of over 75 different curves. These curves are plotted each month as soon as the operating and financial reports are made up, and it is to these curves, and not the monthly reports, that both the executive at the home office and the local manager invariably turn whenever information is desired respecting operating conditions and the general growth and progress of the company.

Of course, graphics will never supplant the "cold figures," as shown in the financial and operating reports, but as a help in showing these figures in their proper perspective graphics are invaluable.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

967,919. Water Sealed Producer Valve. F. G. Hobart, Beloit, Wis., assignor to Fairbanks, Morse & Co., Chicago, Ills.

967,980. Water Regulator for Gas Producers. E. Sandner, Cleveland, O., assignor to J. I. Wile, same place.

968,000. Gas Producer. J. O. E. Trotz, Worcester, Mass.

968,018. Water Back for Gas Ports. A. Wood, 3d, Conshocken, Pa.

968,021. Gas Controller. F. E. Youngs, Detroit, Mich., assignor to Equitable Meter Company, Pittsburgh, Pa.

968,032. Gas Burner. M. Dean, New York City.

968,167. Heating Apparatus for Gas Holders. L. Knorr, Nuremberg, Germany, assignor to Maschinenfabrik Augsburg-Nurnberg A. G., same place.

968,176. Gas Burner for Lamps. H. D. Penney, Pelham, N. Y., assignor of one-half to W. H. Reid, Brooklyn, N. Y.

968,307. Gas Scrubber. E. Yawger, Edgewood Park, Pa., assignor to the Westinghouse Machine Company.

968,370. Gas Purifier. H. I. Lea, Pittsburgh, Pa., assignor to the Westinghouse Machine Company.

968,375. Incandescent Mantle Lamp. C. M. Lungren, Bayonne, N. J., assignor to Safety Car Heating and Lighting Company.

968,457. Gas Controlling Device. H. Epstein and D. Lubinsky, Brooklyn, N. Y., assignors of one-third to I. J. Kaufman, same place.

968,458. Gas Producer. W. C. Finck, Elizabeth, N. J., assignor to G. H. Benjamin, New York City.

968,486. Automatic Cas Lighter. Joseph C. Landers, Collegeville, Pa.

968,509. Process of Recovering Naphthaline from Gas. R. H. Bots, Syracuse, N. Y.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. H. R. MOSUAT informs us that bids for a complete water gas plant and a high pressure system of distributing mains (not less than 6 miles) will be opened in Belle Plaine, Ia., at noon of the 10th inst. Complete information can be obtained by communicating with him at Belle Plaine.

"H. H. H.," writing to us from Tacoma, Wash., under date of August 24th, says: "I am pleased to advise you that we did, on the 14th inst., complete the installation of a 4-inch, high pressure gas line, extending from our works here in Tacoma to the works of our property in Olympia, the Capitol of this State. This line was thrown into service without accident, and we are now satisfactorily supplying the city of Olympia from our gas works here. The Olympia property came into our hands through receiver's sale, and was purchased by myself on the 15th of February last, since which time we have been extending and building up the property, in the belief that it would be a nice addition to the H. M. Byllesby's holdings in the Northwest."

AN important decision was handed down by Judge Walling, sitting in Court of Common Pleas, Erie county, Pa., in the case entited "The City of Erie *vs.* Pennsylvania Gas Company," on appeal from May term, No. 81, 1909. The suit was brought *in assumpsit*, to recover an annual license fee of $30 a mile on the gas mains of defendant in said city. The legal conclusions are:

1. A city has the right, in the exercise of its police powers, to supervise and inspect lines of gas mains, water mains, etc., which are located in its public streets, and to impose a reasonable charge as a license fee to reimburse it for the probable expense of such inspection and supervision, and the presumption is that the city officials, in so doing, acted in good faith and that their action is valid.

2. The action of the city, however, is not conclusive but is subject to review by the courts. But the courts cannot interfere except where the license fee is clearly excessive and unreasonable.

3. In deciding whether such license fee is clearly excessive and unreasonable, each case must stand quite largely on its own facts.

4. While the license fee in question may seem large, it is not in our opinion so clearly excessive as to justify setting it aside.

5. That judgment should be entered for plaintiff for $3,000, with interest from June 1, 1908, and costs.

Discussion.—A municipality can levy an annual license tax in such a case as this; and as we understand the law, the court cannot interfere except in case of gross abuse. The courts cannot regulate the license fees on poles and wires, by virtue of the Act of April 17, 1905, P. L. 183; but that act does not extend to gas and water mains. A municipality is liable for the condition of its streets, and even where corporations using the streets exercise due care, the city may still supervise and inspect and make a reasonable charge therefor. Natural gas, even at the best, is a dangerous agency and justifies as great care as do poles and wires and street cars. There are many cases where an annual license tax of $1 a pole was sustained prior to Act of 1905. That would amount to perhaps $30 for a pole line a mile in length. And the courts have sustained an annual license fee of $25 each upon the cars of an electric street railway. So far as we can see, 30 poles or a street car could be inspected and watched as easily as a mile of gas main with its connections, and the license fee here is no more excessive than in those cases. The truth is that poles and wires and street cars and gas and water pipes are all elements of danger in the public streets and require constant daily watching cars, and the law seems to permit the city police officers to bestow that watching and care and to permit the city to recover a license fee therefor. Such license fee seems to be justified more on account of general care and supervision than of particular inspections. It would be difficult for the city to show just what its officers had done with reference to a pole line, a gas line or a street railway. Three thousand dollars seems large as an annual fee, but defendant has 100 miles of gas mains besides street connections, and serves about 14,000 consumers, and said license fee amounts to about 21 cents a year for each customer. Under the present license fee for street cars in Erie, a company having 120 cars would pay as much in license fees as defendant. The license fee in question against defendant only equals about 5½ per cent. of what the city pays its police department. However, we do not contend that it is reasonable, but only that it is not so unreasonable as to be void. The city's right to collect an annual mileage

license fee on gas and water mains is well settled. And now, August 22, 1910, the prothonotary is directed to give notice of this decision forthwith to the parties or their attorneys and to enter judgment for plaintiff as above stated, unless exceptions are filed within 30 days after such notice."

"W. B. M.," writing from Wilkes-Barre, Pa., under date of August 27th, incloses the following: "The Forty Fort (Pa.) Borough Council, in awarding a contract to the Luzerne County (Pa.) Gas and Electric Light Company, for 59 arc lights at $55 a light per year, bargained also for the disposal of its municipal lighting plant, which is of the electric lighting type. Public ownership of the Forty Fort lighting plant has been a complete failure. According to the report of Lighting Committee of Council the arc lights have been costing the Borough $70 each per year more than they would cost were the plant controlled by a private corporation--$15 more per annum, at least. The plant, which has been in operation since 1898, has never been on a self-supporting basis. By the terms of the contract the Company is to buy the light plant under an appraisal on the 3-expert basis. The agreement with the Luzerne County Company provides that the cost of current to private consumers shall never exceed the present charge—10 cents a kilowatt—and that arc lights shall be furnished on the basis of $55 each per year for a period of 10 years—midnight schedule—with the privilege of renewing the contract for a further period of 20 years."

Mr. F. D. Murphy, Manager of the Commercial division of the business of the Elmira (N. Y.) Water, Light and Railway Company, for some time back, is now in harness at Altoona, Pa., where he was named to act as General Manager of the Altoona (Pa.) Gas Company.

Mr. C. N. Wiley, formerly Superintendent of the water and electric divisions of the Beloit Water, Gas and Electric Company, of Beloit, Wis., has removed to Lordsburg, N. M., where he is to act as General Manager of the property known as the Warner Copper Mines.

It is reported that Mr. W. D. Weimer, of MacAlester, Okla., has repurchased the MacAlester Gas Light Company from the Edward M. Deane Company, who bought it from him some time ago.

The New York Improved Equipment Company is installing the new benchwork on the plant of the Mount Clemens (Mich.) Gas Light Company.

The Fall River (Mass.) Gas Works Company is making notable main extensions. It has also purchased the plot and property next north of the Fall River Savings Bank, east of North Main street, whereon the Company proposes to erect next year a handsome office building.

Mr. Thomas D. Miller, writing to the Journal, from Cedar Rapids, Ia., under date of the 24th ult., says: To the Editors, American Gas Light Journal: I note, under the head "Items of Interest from Various Localities," in Journal for 22d inst., a bit of innuendo, with a capital "I," from the hands of Mr. Richard Schaddelee, with reference to the situation in Cedar Rapids. I feel that this was entirely uncalled for and am inclosing you a copy of my story of the 90-cent franchise. Every statement of fact contained in the story has gone unchallenged, and, to the best of my knowledge and belief, is absolutely true. The attitude I was in towards Averill, is a matter entirely foreign to the discussion between Mr. Schaddelee or Messrs. Child-Hulswit & Co. The campaign that I would have made had they kept out would have been of an entirely different character, and for which I would have found ample warrant here in Cedar Rapids. Their coming into the situation has entirely changed everything. The fight was precipitated by them and the challenge was issued by them. Mr. Schaddelee has not published such a statement as this in Cedar Rapids, because he knows it would strengthen my case if he would give an open denial. One of the things that I am attempting to do is to disabuse the minds of the people of Cedar Rapids of the idea that I am in any way connected with the old Company or Child-Hulswit & Co. They have charged me with piracy, and expressed the desire at the start that no personality should enter into the fight, and, so far as I am concerned, none have been introduced; but this effort to place me in a false light before the gas fraternity, where he knows I am better known by far than he is, is plain in the extreme. * * * This day week (Wednesday, Aug. 31) will settle the fight; then we will know who's who."

Mr. Lloyd C. Gates, for several years Cashier for the Cairo City (Ills.) Gas, Electric and Traction Company, has resigned. His successor is Mr. H. A. Helscher, of Keota, Ia.

Mr. S. E. Linton, for a long time Manager of the Vicksburg (Miss.) Gas Company, has been chosen Manager of the Company at Sioux Falls, S. D, His successor is Mr. J. J. Gannon.

Mr. Elwood W. Hutchins, of Boston, Mass., has been elected a Director of the Cambridge (Mass.) Gas Light Company, succeeding the late Mr. Henry A. Rand.

Work has been resumed on the reconstruction of the plant of the Modesto (Cal.) Gas Company.

Last Tuesday a chap, calling himself Charles Ellis, visited the apartment house No. 140 Brook street, Bronx section, New York city. He was met by Mrs. William Grizelle, to whom he announced that he was an inspector for the gas company, and would like to take the meter statement. Mrs. Grizelle, who was in the personal possession of a rolling pin, or a potato smasher, or something akin thereto, shrieked, "You're an impostor"—the rolling pin or else descended on the head of Ellis—she shrieked, "You're the robbor that has been robbing our apartments and stripping the meters." Whack, the rolling pin or else; and the scurrying tramp, tuned to the swishing of skirts, was heard from every apartment. In a twinkling the thief was the center of a flying wedge of irate women, who smashed him with coal shovels, slammed him with towels, soaked him with dishwater, whallopped him with dusters, rolling pins, papers, ironing boards, and such." Finally the wedge was parted by 3 lusty policemen and Ellis's life was saved. He was taken to the 152d street police station and searched. On him were discovered $122 in quarter dollars, $32 in bills, a bunch of skeleton keys, and several charts showing the location of many coin-feed meters. He will be tried for burglary later on.

The Morris Park (N. Y.) Taxpayers' Association has employed Attorney W. H. Giegerich to proceed for damages forthwith against the Fidelity Development Company, which some years ago bought up the famous racecourse known as Morris Park, for the purpose of developing its broad acres into a residential section. In the deeds to the property, subsequently sold to individual buyers, it was plainly pledged that gas mains would be laid through the entire section; but such pledge has been neglected (4 years have elapsed between promise and performance) to the present. The Association now seeks legal aid to oblige the Company to redeem its pledges; not only so, but to recover damages for failure to complete the pledges ere this.

Could anything be more dastardly than this, which account was published in the New Haven (Conn.) papers dated the 25th ult.: "Greens Farms, Conn., Aug. 24.—Burglars who entered the summer home of Mr. C. E. Bedford, Manager of the marine oil department of the Standard Oil Company, removed the tips from the gas jets in the rooms of Mr. Bedford, his three children, a nurse in the Bedford household, and Mr. and Mrs. Arthur Lewis, who were visiting the family. All of them were seriously affected. Mrs. Lewis was aroused by one of the men upsetting a bureau drawer in his attempt to rifle it, which happening saved the other occupants from death. Her screams aroused her husband and Mr. Bedford, and although both were scarcely able to stand, as a result of inhaling the fumes, they stopped the flow of gas, resuscitating the children, nurse and Mrs. Lewis, who sank into unconsciousness as soon as she had spread the alarm."

The Delphos (O.) plant of the Consolidated Gas and Light Company was sold at public auction, on the steps of the Van Wert (O.) Court House, at noon of the 23d ult. The named purchaser was Mr. Alexander Shenk, whose bid was $16,667. There is little doubt that the property was bought in by the Receiver, Mr. B. J. Brotherton.

Construction work has been begun on the proposed new office building for the Atlantic City (N. J.) Gas Company, the site for which is at the intersection of Michigan and Atlantic avenues—right in the very heart of the best business section. The architects are Messrs. Stout & Rubenack.

The City Council, of Cortland, N. Y., has assented to a renewal of the franchise of the Homer and Cortland Gas Light Company for a period of 50 years. The Company agreed to remove its old holder at the foot of Charles street and deed the site to the city. Further, it agreed to put the selling rate at $1.50 per 1,000, on and after April 1, 1911.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

MONDAY, SEPTEMBER 5, 1910.

The Market for Gas Securities.

Mr. Theodore Roosevelt's stirring words in the woods of the West have had their usual effect on the money market. Values go to smash when his virile (not to say violent) speech is wafted eastward. This seems the tenable reason for the weakness of the moment in Consolidated gas. It opened to-day (Friday) at 128½ to 129, and in common with the balance of the market, the seeming was that lower prices would be quoted before adjourning time was at hand.

Brooklyn Union to the contrary, was inclined to move the other way, the ratable value having been returned as 132 to 135. Lacledes are dull and weak, Peoples, of Chicago, is steady, and Massachusetts Gas Companies maintains its recent sharp advance.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

SEPTEMBER 5.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	128¼	129
Central Union Gas Co. —				
1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,600,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98¼	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	132	135
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¼	107
Yonkers	999,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	¾	⅞
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73¼
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed				
Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric				
C	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. &				
Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75¼	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	106½	—
Mortgages, 6's	3,600,000		89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co.,				
Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co.,				
1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of				
New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co.,				
of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	99	99½
Preferred	2,500,000	100	85	86½
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¼
" 6 per cent. scrip,				
due 1910	100,000	25	60	60½
Massachusetts Gas Compan-				
ies, of Boston	25,000,000	100	80⅛	81⅛
Preferred	25,000,000	100	91¾	92
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co.,				
Chicago	25,000,000	100	106	106¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	200	375	380
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	361	—

Advertisers' Index.

New advertising, or changes in standing ads., to assure attention the issue following their reception, must be in hand on Wednesday.

AMMONIA CONCENTRATORS.
Bartlett-Hayward Co., Baltimore, Md. 473
Fred Bredel Co., Milwaukee, Wis. 470
Michigan Ammonia Works, Detroit, Mich. 450
The Gas Machinery Co., Cleveland, O. 407
Western Gas Construction Co., Fort Wayne, Ind. 432

BURNERS.
Wm. M. Crane Co., New York City. 464

CEMENTS AND CONCRETES.
C. L. Gerould, New Castle, Pa. 468
Ernst Strassburger, Chicago, Ills. 470
Laclede-Christy Clay Products Co., St. Louis, Mo. 458

CHARGING BARROWS & COAL WAGONS.
Davis & Farnum Mfg. Co., Waltham, Mass. 472
Kerr Murray Mfg. Co., Fort Wayne, Ind. 475
The Stacey Mfg. Co., Cincinnati, O. 475

COKE CRUSHERS.
Bartlett-Hayward Co., Baltimore, Md. 473
C. M. Keller, Columbus, Ind. 471

CONVEYORS—ALL KINDS.
Bartlett-Hayward Co., Baltimore, Md. 473
Brown Hoisting Machinery Co., Cleveland, O. 465
Cruse-Kemper Co., Ambler, Pa. 460
C. W. Hunt Company, New York City. 458
Fred Bredel Co., Milwaukee, Wis. 470
G. A. Bronder, New York City. 469
Kerr Murray Mfg. Co., Fort Wayne, Ind. 475
The Gas Machinery Co., Cleveland, O. 407
The Stacey Mfg. Co., Cincinnati, O. 475
Western Gas Construction Co., Fort Wayne, Ind. 432

EXHAUSTERS.
Connelly Iron Sponge & Governor Co., New York City 469
Connersville Blower Company, Connersville, Ind. 476
Davis & Farnum Mfg. Co., Waltham, Mass. 472
Isbell-Porter Company, Newark, N. J. 459
Kerr Murray Mfg. Co., Fort Wayne, Ind. 475
Piqua Blower Co., Piqua, O. 461
The P. H. & F. M. Roots Co., Connersville, Ind. 463

GAS AND WATER PIPES.
Davis & Farnum Mfg. Co., Waltham, Mass. 472
Donaldson Iron Co., Emaus, Pa. 464
R. D. Wood & Co., Philadelphia, Pa. 478

GAS BLAST FURNACES.
American Gas Furnace Co., New York City. 456

GAS COALS.
Berwind-White Coal Mining Co., New York and Phila. 470
Westmoreland Gas Coal Co., Philadelphia, Pa. 471

GAS COCKS.
H. Mueller Manufacturing Co., Decatur, Ills. 465

GAS ENGINEERS.
Bartlett-Hayward Co., Baltimore, Md. 473
Cruse-Kemper Co., Ambler, Pa. 460
Davis & Farnum Mfg. Co., Waltham, Mass. 472
Drakes Limited, Halifax, England. 462
Edwin E. Witherby, New York City. 460
Evens & Howard Firebrick Co., St. Louis, Mo. 455
Frank D. Moses, Trenton, N. J. 464
Fred Bredel Co., Milwaukee, Wis. 470
Frederick J. Mayer, New York City. 468
Glenn Marston, New York City. 450
Henry I. Lea, Chicago, Ills. 472
H. M. Byllesby & Co., Chicago, Ills. 472
H. Thurston Owens, New York City. 450
Humphreys & Glasgow, New York City. 472
Improved Equipment Company, New York City. 463
Isbell-Porter Co., Newark, N. J. 459
Kerr Murray Mfg. Co., Fort Wayne, Ind. 475
Laclede-Christy Clay Products Co., St. Louis, Mo. 458
Light, Heat and Power Corporation, Boston, Mass. 458
Parker Russell Mining and Mfg. Co., St. Louis, Mo. 468
Quintard Iron Works, New York City. 461
R. D. Wood & Co., Philadelphia, Pa. 478
The Gas Machinery Co., Cleveland, O. 407
The Stacey Mfg. Co., Cincinnati, O. 475
The United Gas Improvement Co., Philadelphia, Pa. 467
Western Gas Construction Co., Fort Wayne, Ind. 432
William A. Baehr, Chicago, Ills. 450
William W. Randolph, New York City. 465

GAS ENRICHERS.
Standard Oil Co., New York City. 423

GAS GAUGES.
The Bristol Co., Waterbury, Conn. 464

GAS GOVERNORS.
Chaplin-Fulton Mfg. Co., Pittsburg, Pa. 469
Connelly Iron Sponge & Governor Co., New York City. 469
Evens & Howard Firebrick Co., St. Louis, Mo. 455
Isbell-Porter Co., Newark, N. J. 459
Pittsburg Meter Co., East Pittsburg, Pa. 462
Reynolds Gas Regulator Co., Anderson, Ind. 479

GASHOLDERS.
Bartlett-Hayward Co., Baltimore, Md. 473
Chicago Bridge and Iron Works, Chicago, Ills. 454
Cruse-Kemper Co., Ambler, Pa. 460
Davis & Farnum Mfg. Co., Waltham, Mass. 472
Deily & Fowler Mfg. Co., Philadelphia, Pa. 476
Kerr Murray Mfg. Co., Fort Wayne, Ind. 475
R. D. Wood & Co., Philadelphia, Pa. 478
Riter-Conley Mfg. Co., Pittsburgh, Pa. 452
The Stacey Mfg. Co., Cincinnati, O. 475
Western Gas Construction Co., Fort Wayne, Ind. 432

GAS MAIN STOPPERS.
Safety Gas Main Stopper Co., New York City. 471

GAS METER CONNECTIONS.
H. Mueller Manufacturing Co., Decatur, Ills. 465

GAS METERS.
American Meter Co., New York and Philadelphia. 469
D. McDonald & Co., Albany, N. Y. 467
Helme & McIlhenny, Philadelphia, Pa. 469
John J. Griffin & Co., Philadelphia, Pa. 480
Keystone Meter Co., Royersford, Pa. 468
Maryland Meter and Mfg. Co., Baltimore, Md. 468
Metric Metal Co., Erie, Pa. 469
Nathaniel Tufts Meter Co., Boston, Mass. 468
New York Improved Meter Co., New York City. 462
Pittsburg Meter Co., East Pittsburg, Pa. 462
Rotary Meter Co., New York City. 477
Sprague Meter Co., Bridgeport, Conn. 477

GAS PLANT TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills..... 465

GAS STOVES.

American Meter Co., New York and Philadelphia..... 477
Keystone Meter Co., Royersford, Pa..... 478
Maryland Meter & Manufacturing Co., Baltimore, Md... 478
Nathaniel Tufts Meter Co., Boston, Mass..... 478

GAS TAPPING MACHINES.

George Light, Dayton, O..... 471
H. Mueller Manufacturing Co., Decatur, Ills.....465

GAS WORKS APPARATUS AND CONSTRUCTION.

Bartlett-Hayward Co., Baltimore, Md..... 473
Connelly Iron Sponge & Governor New Co., York City. 469
Cruse-Kemper Co., Ambler, Pa..... 470
Davis & Farnum Mfg. Co., Waltham, Mass..... 472
Delly & Fowler Mfg. Co., Philadelphia, Pa..... 476
Evens & Howard Firebrick Co., St. Louis, Mo..... 455
Fred Bredel Co., Milwaukee, Wis..... 470
Gas Engineering Co., Trenton, N. J..... 464
Humphreys & Glasgow, New York City..... 460
Improved Equipment Company, New York City..... 453
Isbell-Porter Co., New York City..... 459
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 475
Laclede-Christy Clay Products Co., St. Louis, Mo..... 468
Lloyd Construction Co., Detroit, Mich..... 456
Quintard Iron Works Co., New York City..... 461
R. D. Wood & Co., Philadelphia, Pa..... 478
Riter-Conley Mfg. Co., Pittsburgh, Pa..... 452
The Gas Machinery Co., Cleveland, O..... 407
The Stacey Mfg. Co., Cincinnati, O..... 475
The United Gas Improvement Co., Philadelphia, Pa... 467
Western Gas Construction Co., Fort Wayne, Ind..... 432

HIGH PRESSURE GAS GOODS.

H. Mueller Manufacturing Co., Decatur, Ills..... 465

HOT WATER HEATERS.

Humphrey Co., Kalamazoo, Mich..... 456

INCANDESCENT GAS LAMPS.

General Gas Light Co., Kalamazoo, Mich..... 457
Welsbach Company, Gloucester, N. J..... 466

INCLINED RETORTS.

Baltimore Retort and Firebrick Co., Baltimore, Md... 468
Didier-March Co., New York City..... 474
Evens & Howard Firebrick Co., St. Louis, Mo..... 455
Fred Bredel Co., Milwaukee, Wis..... 470
Gas Bench Construction Co., St. Louis, Mo..... 471
Improved Equipment Company, New York City..... 453
Laclede-Christy Clay Products Co., St. Louis, Mo..... 458
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 468

MAIN AND SERVICE LAYING.

Sullivan Bros., Flushing, N. Y..... 471

PATENTS, TRADE-MARKS & COPYRIGHTS

Royal E. Burnham, Washington, D. C..... 471

PIPE LINE TOOLS.

H. Mueller Manufacturing Co., Decatur, Ills..... 465

PREPAYMENT METER ATTACHMENTS.

New York Improved Meter Co., New York City..... 462

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia..... 479
D. McDonald & Co., Albany, N. Y..... 477
Helme & Mollhenny, Philadelphia, Pa..... 479
John J. Griffin & Co., Philadelphia, Pa..... 480
Keystone Meter Co., Royersford, Pa..... 478
Nathaniel Tufts Meter Co., Boston, Mass..... 478
New York Improved Meter Co. New York City..... 478
Pittsburg Meter Co., East Pittsburg, Pa..... 462
Sprague Meter Co., Bridgeport, Conn..... 477

PROCESSES.

Bartlett-Hayward Co., Baltimore, Md..... 473
Fred Bredel Co., Milwaukee, Wis..... 470
Humphreys & Glasgow, New York City..... 472
Improved Equipment Company, New York City..... 453
The Gas Machinery Co., Cleveland, O..... 407
The United Gas Improvement Co., Philadelphia, Pa... 467
Western Gas Construction Co., Fort Wayne, Ind..... 432

PRODUCER POWER PLANTS.

R. D. Wood & Co., Philadelphia, Pa..... 478

PURIFIER AND SCRUBBER TRAYS.

Bartlett-Hayward Co., Baltimore, Md..... 473
Cabot Mfg. Co., Hoboken, N. J..... 471
Western Gas Construction Co., Fort Wayne, Ind..... 432

PURIFIERS.

Bartlett-Hayward & Co., Baltimore, Md..... 473
Connelly Iron Sponge & Governor Co., New York City. 469
Cruse-Kemper Co., Ambler, Pa..... 460
Davis & Farnum Mfg. Co., Waltham, Mass..... 472
Evens & Howard Firebrick Co., St. Louis, Mo..... 456
Isbell-Porter Co., Newark, N. J..... 459
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 475
Quintard Iron Works, New York City..... 461
R. D. Wood & Co., Philadelphia, Pa..... 478
The Stacey Mfg. Co., Cincinnati, O 475
The United Gas Improvement Co., Philadelphia, Pa... 467
Western Gas Construction Co., Fort Wayne, Ind..... 432

PURIFYING MATERIALS.

Connelly Iron Sponge & Governor Co., New York City 469
The United Gas Improvement Co., Philadelphia, Pa... 467

REGENERATIVE FURNACES.

Baltimore Retort and Firebrick Co., Baltimore, Md.. 468
Bartlett, Hayward & Co., Baltimore, Md..... 473
Didier-March Co., New York City..... 474
Evens & Howard Firebrick Co., St. Louis, Mo..... 455
Fred Bredel Co., Milwaukee, Wis..... 470
Gas Bench Construction Co., St. Louis, Mo..... 461
Improved Equipment Company, New York City..... 453
J. H. Gautier & Co., Jersey City, N. J..... 468
Laclede-Christy Clay Products Co., St. Louis, Mo..... 458
Missouri Firebrick Co., St. Louis, Mo..... 468
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 468

RETORTS AND FIREBRICKS.

Baltimore Retort and Firebrick Co., Baltimore, Md... 468
Didier-March Co., New York City..... 474
Evens & Howard Firebrick Co., St. Louis, Mo..... 455
Fred Bredel Co., Milwaukee, Wis..... 470
Gas Bench Construction Co., St. Louis, Mo..... 461
Henry Maurer & Son, New York City..... 461
Improved Equipment Company, New York City..... 453
James Gardner, Jr., Co., Bolivar, Pa..... 466
J. H. Gautier & Co., Jersey City, N. J..... 468
Laclede-Christy Clay Products Co., St. Louis, Mo..... 458
Missouri Firebrick Co., St. Louis, Mo..... 468
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.... 468

RUBBER GOODS.

New York Rubber Co., New York City..... 456

SCRUBBERS AND CONDENSERS.

Bartlett-Hayward Co., Baltimore, Md..... 473
Cruse-Kemper Co., Amler, Pa..... 460
Davis & Farnum Mfg. Co., Waltham, Mass..... 472
Evens & Howard Firebrick Co., St. Louis, Mo..... 455
Fred Bredel Co., Milwaukee, Wis..... 470
Isbell-Porter Co., Newark, N. J..... 459
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 475
Quintard Iron Works, New York City..... 461
R. D. Wood & Co., Philadelphia, Pa..... 478
Riter-Conley Mfg. Co., Pittsburgh, Pa..... 452
The Gas Machinery Co., Cleveland, O..... 407
The Stacey Mfg. Co., Cincinnati, O. 475
The United Gas Improvement Co., Philadelphia, Pa... 467
Western Gas Construction Co., Fort Wayne, Ind..... 432

SELF-SEALING MOUTHPIECE DOORS.

Bartlett-Hayward Co., Baltimore, Md..... 473
Davis & Farnum Mfg. Co., Waltham, Mass..... 472
Fred Bredel Co., Milwaukee, Wis..... 470
Isbell-Porter Co., Newark, N. J..... 459
Improved Equipment Company, New York City..... 453
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 475
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 468
Quintard Iron Works, New York City..... 461
R. D. Wood & Co., Philadelphia, Pa..... 478
The Gas Machinery Co., Cleveland, O..... 407
The Stacey Mfg. Co., Cincinnati, O..... 475
Western Gas Construction Co., Fort Wayne, Ind..... 432

STOKING MACHINERY.

Fred Bredel Co., Milwaukee, Wis..... 470
G. A. Bronder, New York City..... 469
Laclede-Christy Clay Products Co., St. Louis, Mo..... 458
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 468

STORAGE TANKS.

Bartlett-Hayward Co., Baltimore, Md..... 473
Davis & Farnum Mfg. Co., Waltham, Mass..... 472
Quintard Iron Works, New York City..... 461
The Stacey Mfg. Co., Cincinnati, O..... 475
Western Gas Construction Co., Fort Wayne, Ind..... 432

STREET LAMPS.

Thos. T. W. Miner, New York City..... 458
Welsbach Street Lighting Co., New York and Phila.. 466

TAR AND CARBONIC ACID EXTRACTOR.

Bartlett-Hayward Co., Baltimore, Md..... 473
Fred Bredel Co., Milwaukee, Wis..... 470
Isbell-Porter Co., Newark, N. J..... 459
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 475
The Gas Machinery Co., Cleveland, O..... 407
The Stacey Mfg. Co., Cincinnati, O..... 475
The United Gas Improvement Co., Philadelphia, Pa... 467
Western Gas Construction Co., Fort Wayne, Ind..... 432

VALVES.

Bartlett-Hayward & Co., Baltimore, Md..... 473
Davis & Farnum Mfg. Co., Waltham, Mass..... 472
Isbell-Porter Co., Newark, N. J..... 459
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 475
Ludlow Valve Manufacturing Co., Troy, N. Y..... 461
R. D. Wood & Co., Philadelphia, Pa..... 478
The Gas Machinery Co., Cleveland, O..... 407
The P. H. & F. M. Roots Co., Connersville, Ind..... 463
The Stacey Mfg. Co., Cincinnati, O..... 475
Western Gas Construction Co., Fort Wayne, Ind..... 432

VERTICAL S'S.

Connelly Iron Sponge & Gov. Co. (Drake's [Eng.] System) 469
Didier-March Co., New York City..... 474
Evens & Howard Firebrick Co., St. Louis, Mo..... 455
Fred Bredel Co., Milwaukee, Wis..... 470
Gas Bench Construction Co., St. Louis, Mo..... 461
Improved Equipment Company, New York City..... 453
Laclede-Christy Clay Products Co., St. Louis, Mo..... 458
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. .. 468

WATER METERS.

Pittsburg Meter Co., East Pittsburg, Pa..... 462

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

IMPROVED AMMONIA CONCENTRATOR.

About 130 in use. Write to

STROH & OSIUS, Patentees, or

MICHIGAN AMMONIA WORKS. - Detroit, Mich.

H. Thurston Owens,

CONSULTING ENGINEER,

LIGHT, HEAT AND VENTILATION,

1147 Broadway,

NEW YORK CITY.

WILLIAM A. BAEHR,

CONSULTING ENGINEER,

Peoples Gas Building,

CHICAGO.

Also Representing

The Bartlett-Hayward Company.

EDWIN E. WITHERBY,

SPECIAL REPRESENTATIVE

GAS MACHINERY COMPANY,

CLEVELAND, O.,

Will advise on commercial engineering subjects and operation of gas and electric properties.

40 WALL STREET, - NEW YORK.

GLENN MARSTON,

NEW YORK CITY.

MUNICIPAL STATISTICS.

Information for New Business and Commercial and Municipal Ownership Campaigns. :: :: :: :: ::

CIVIC AND BUSINESS MEN'S ORGANIZATIONS PERFECTED.

POSITION WANTED

As Superintendent of Coal or Water Gas Plant

In town of 12,000 or smaller, by young man at present employed in same capacity. Good education and excellent experience in all the work. References furnished and results in present position shown.

1837-3 Address, "H. F.," care this Journal.

Position Wanted.

Superintendent of gas company in Western city of 25,000 desires to change location for personal reasons. Married; strictly temperate. Experienced in both gas and electricity. References if desired.

1837-6 Address, "M. S.," care this Journal.

Position Wanted

BY PRACTICAL GAS DISTRIBUTION MAN.

Nineteen years' experience. Age, 33.

1838-2 Address, "I. C. B.," care this Journal.

Position Wanted.

Technical graduate, with successful experience in by-product coke work, desires position as manager or superintendent for gas company. Would consider low salary with bonus proportional increase of profits.

1839-2 Address, "Y. Y.," care this Journal.

Wanted at Once,

A First-Class Water Gas Maker.

None other need apply. State salary wanted and experience. Plant making 50,000 feet of gas per day.

Address, WATERTOWN GAS CO.,

1838-2 Watertown, S. D.

WANTED.

SOLICITOR,

By Antigo Gas Company, Antigo, Wis. Commission method of payment preferred.

1839-2

Salesman Wanted

To canvass gas companies in the Middle West with a complete line of gas ranges and appliances. Must have previous experience in this line and a thorough acquaintance with gas companies. A liberal salary will be offered to the right man.

1836-6 RATHBONE, SARD & CO., Aurora, Ills.

WANTED,

A RETORT HOUSE FOREMAN

For a coal gas plant making 25,000,000 feet annually. If you cannot handle men and produce results do not answer. Address, "F. F. V.,"

1839-2 Care this Journal.

WANTED.

AN AUDITOR is desired by a gas and electric company in the East, serving a population of between 600,000 and 700,000. In answering, please state experience in detail, salary expected, age and references.

1839-2 Address, "EXPERT," care this Journal.

WANTED,

By Muskogee Gas and Electric Company, Muskogee, Okla., first-class meter repair man and prover. State age, experience, references and salary expected. Position open Sept. 1.

1839-2

WANTED,

By gas company in a Southern city, a first class, experienced solicitor, who is thoroughly familiar with both the lighting and fuel ends of the business, and who can produce results. Applicant should state age, salary wanted, experience and references.

Address, "NEW BUSINESS,"

1839-2 Care this Journal.

WANTED,

A First-Class, Experienced Solicitor.

Only those having exceptionally good records for securing new business need apply.

Address, H. M. WALLACE,

1839-2 705 Union Trust Building, Detroit, Mich.

FOR SALE AT ATTRACTIVE PRICES.

Blowers.—2 Connersville 68 ft. d.c. to vertical engines; 2 McKenzie, belt; 2 positive gas Sturtevant No. 10, belt, with 2 horizontal engines; 3 Roots No. 6, 37 ft. d.c. to vertical engines.

Exhausters.—1 Connersville 58 ft. belt; 2 Connersville 33 ft. d.c. to vertical engines; 3 Wilbraham 55 ft., belt; 1 Roots 37.25 ft. direct; 2 McKenzie 25 ft., belt; 3 McKenzie 15 ft., belt; 1 McKenzie d.c. to vertical engine.

Engines.—1 Phœnix 11 in. by 14 in. horizontal; two 6 in. by 6 in. vertical; 1 Sturtevant, 4 in. by 6 in. vertical, no wheels. (See Blowers and Exhausters.)

Flywheels.—2 C. I., 8 ft. 6 in. diameter, 26 in. face, 10-in. bore.

Station Meters.—One 12 ft. by 12 ft., no drum; one 9 ft. 6 in. by 9 ft. 6 in., no drum; one 9 ft. by 9 ft.; one 8 ft. 3½ in. by 8 ft; one 8 ft. by 8 ft.

Purifiers—4 boxes, 20 ft. by 24 ft. by 3 ft. 6 in., with 3 covers.

Holder.—150,000 cu. ft., 2-lift, in brick tank.

Tanks.—Of various capacities and shapes.

Flanged Fittings—Miscellaneous 16 in., 20 in. and 24 in.

For further particulars apply to

THE BROOKLYN UNION GAS COMPANY,

Kent avenue and Cross street, Brooklyn, N. Y.

1828-3m

FOR SALE.

Tenders will be received for the following second-hand benchwork, up to August 30th:

Arches, 7 feet 6 inches; retorts, 14 inches by 26 inches—McIlhenny lids; need grate and bearing bars. The equipment of about 20 free-firing benches of 6's; furnaces, 12 inches to 14 inches and 28 inches deep. Mains, etc., old style. Bridge pipes, with plugs, old style. The iron in these is in good condition. For particulars, address,

L. J. MONTGOMERY,

1836-tf 150 Nassau street, New York City.

For Sale Cheap,

Two Exhausters (Wilbraham type), belt drive.

One McDonald Station Meter, 8 feet by 8 feet.

One Connelly Automatic Street Main Governor.

One 30,000 Cubic Foot Gasholder, brick tank.

One 40,000 Cubic Foot Gasholder, brick tank.

One 170,000 Cubic Foot Gasholder, brick tank, 2-lift.

Ammonia Washers, Scrubbers, Pumps, Valves, etc.

5,000 Bushels of the Best Western and Connelly Oxide.

All of the above are in excellent condition and sold only because of the discontinuance of the gas plant. For further particulars apply to

ZANESVILLE GAS LIGHT COMPANY,

1838-4 Zanesville, O.

FOR SALE.

Because of an increase in our gas plant we offer for sale one 4-foot McDonald wet station meter. This meter was manufactured in 1905, has been thoroughly overhauled, and is in fine condition. Can deliver at once.

THORNAPPLE GAS & ELECTRIC CO.,

1838-2 HASTINGS, MICH.

JUST PUBLISHED.

Catechism of Central Station Gas Engineering in the United States.

Compiled from the questions and answers sent out to the Practical Class, Trustees Gas Education Fund.

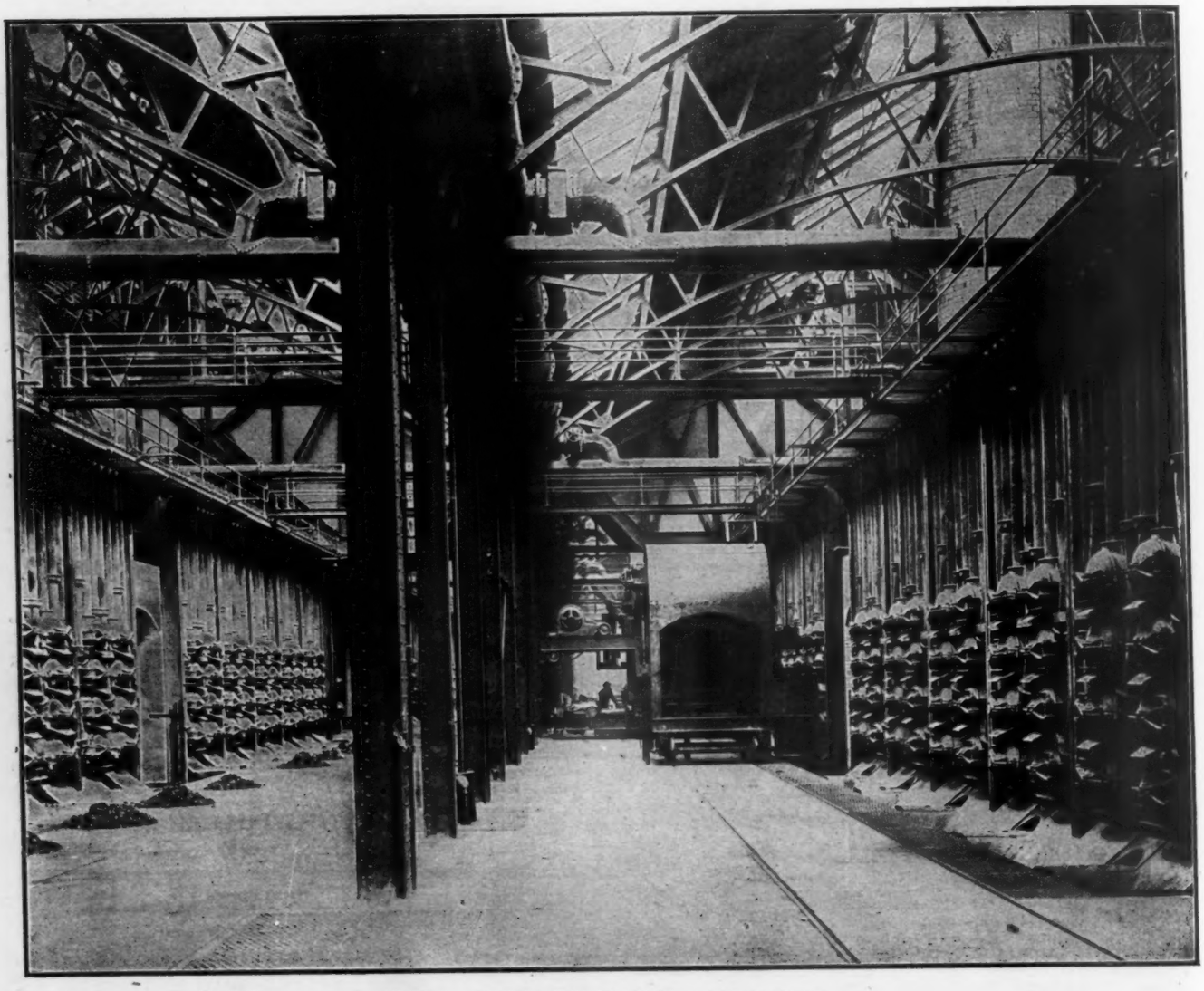
Section I. General Definitions. Section II. Manufacturing Materials. Section III. Manufacturing Plant—Construction and Operation. Section IV. Distribution System and Consumers' Appliances. Section V. Chemical. Section VI. Physical. Section VII. Masonry Construction. Section VIII. Miscellaneous.

6¼ INCHES BY 9 INCHES. 672 PAGES ILLUSTRATED.

PRICE:

Cloth, $5 net, plus postage. Flexible Leather, $7 net, plus postage.

For Sale by TRUSTEES GAS EDUCATIONAL FUND, 58 William Street, New York City.



Eleven Millions Capacity in One Retort House.

RITER-CONLEY MFG. COMPANY,

PITTSBURGH.

PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

COMPLETE COAL GAS PLANTS.

WE STOP CLINKERS.

Hot Weather Benches.

When your benches are equipped with the Doherty Bench Fuel Economizer one of the sources of greatest trouble in operating your benches in hot weather has been removed.

You are not obliged to send your men into the cleanout pit for an hour or more every day to bar down the clinker. With our benches five or ten minutes only are required to remove the ashes.

YOUR men are happier and more contented, besides there are other economies of great value. Let us tell you what the Economizer is doing in half a hundred works, and what can be done at your works.

All types of benches refilled and new benches constructed.

START NOW to improve your conditions.

The Improved Equipment Co.,

60 WALL STREET, NEW YORK.

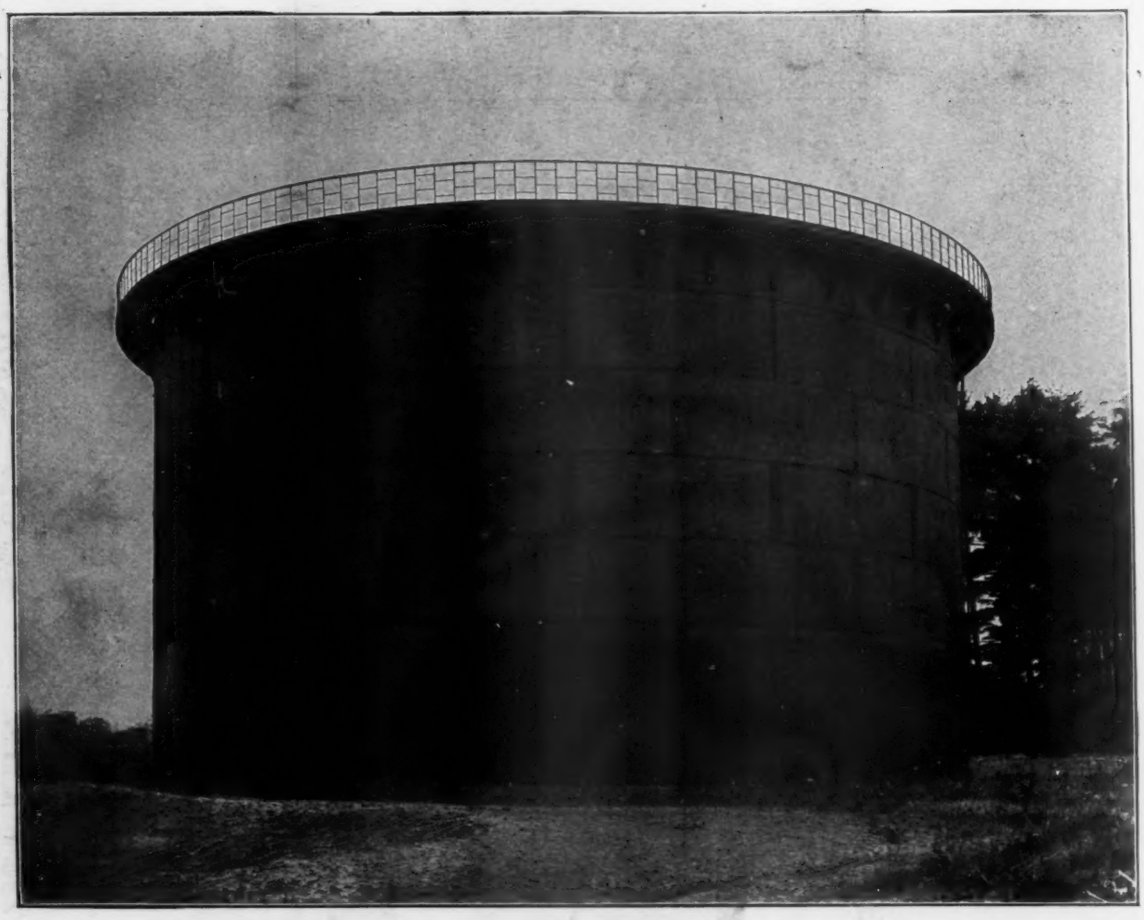
Sole Agents for the Dessau System of Vertical Retorts for Michigan, Ohio, Kentucky, Tennessee, Mississippi and all States West of these.

SOLE LICENSEES FOR THE DOHERTY BENCH FUEL ECONOM'ZER.

GAS HOLDERS,

STANDPIPES—OIL TANKS—SCRUBBERS—WATER TOWERS,

DESIGNED, CONSTRUCTED AND ERECTED.



Capacity, 2,380,000 gallons. SCHENECTADY, N. Y. City Water Works. Diameter 90 feet. Height, 50 feet.

ESTIMATES ON APPLICATION.

CHICAGO BRIDGE AND IRON WORKS,

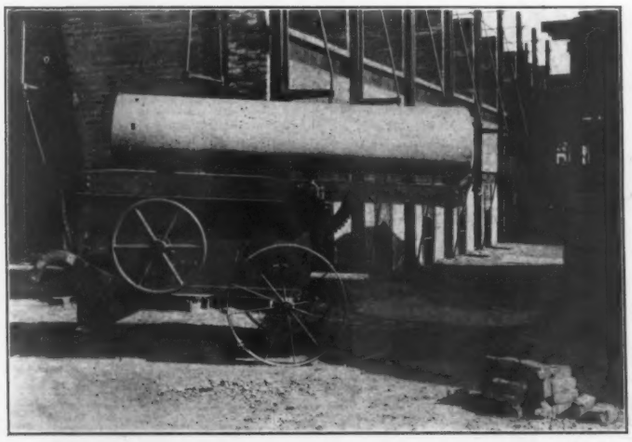
MAIN OFFICE AND WORKS:
Washington Heights Station, Chicago.

BRANCH OFFICES:
30 Church Street, New York, N. Y.
Praetorian Building, Dallas, Texas.

EVENS & HOWARD FIRE BRICK CO.

ST. LOUIS ST. LOUIS ST. LOUIS

LOOK.



600 IN STOCK--READY FOR DELIVERY.
647 SOLD IN LAST EIGHTEEN MONTHS.

ANOTHER LITTLE HINT.

"I honestly believe they are the best retorts that ever came into any of our works."

This was said by the most thorough and capable young gas engineer in the West, after he had tested our retorts against 4 other makes for a period of 14 months.

LISTEN.

The only time we "knock" or use the hammer is in building our hammer-set benches!

Gas Works Division, - - A. S. B. LITTLE, Engineer.

ST. LOUIS ST. LOUIS ST. LOUIS

SAINT LOUIS MISSOURI

RUBBER GOODS

For Gas and Electric Plants.

NEW YORK RUBBER COMPANY,

Incorporated 1851.

FACTORIES: MATTEAWAN, N. Y.

MAIN OFFICES: 84 and 86 Reade St., New York City.

LLOYD CONSTRUCTION COMPANY

GAS APPARATUS.

DETROIT—MICHIGAN

ORDER NOW

TO GET PROMPT SHIPMENT.

HUMPHREY AUTOMATIC GAS WATER HEATERS

Have the valve at the top; easy and cheap to connect; a sootless bunsen flash pilot; a galvanized, rust-proof, non-clogging burner, and many oth er things making for trouble freedom and high efficiency. ∴ ∴ ∴ ∴

GUARANTEED.

They Make Pleased Users.

HUMPHREY CO.,
Kalamazoo, Mich.

GAS FURNACES AND HEATING MACHINES

WHAT WE MANUFACTURE:
Pressure Blowers,
Gas Blast Furnaces,
Heating Machines,
Blow Pipes & Burners.

STATE

AMOUNT - -
SIZE - - -
KIND - - -

OF WORK

to be done in given time.

No. 51 Heating Machine for Coloring and Tempering

FOR

INDUSTRIAL PURPOSES.

A MOST PROFITABLE DEPARTMENT FOR GAS COMPANIES.

CATALOGUE SENT ON APPLICATION.

—AND—

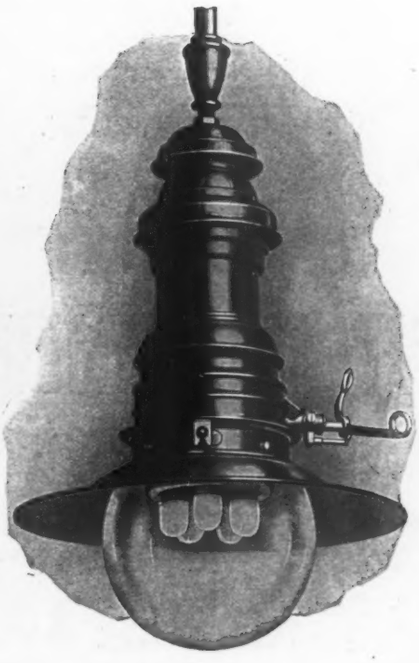
OUR CARBONIA FINISH OR GUN METAL FINISH ON STEEL AND IRON.

AMERICAN GAS FURNACE CO.

24 John Street, New York, N. Y.

ASSOCIATE YOURSELF WITH A SUCCESS.

"THE GAS COMPANY'S LAMP."



ONCE IN, NEVER OUT.

THE HUMPHREY INVERTED GAS ARC LAMP.

GENERAL GAS LIGHT COMPANY,

KALAMAZOO. NEW YORK. SAN FRANCISCO.

THE FOLLOWING IS A PARTIAL LIST OF PLACES WHERE WE HAVE RECEIVED CONTRACTS FOR GAS BENCH WORK SINCE JAN. I, 1910:

ABERDEEN, WASH.
ALBION, MICH.
ANNISTON, ALA.
AUBURN JUNCTION, IND.
BARABOO, WIS.
CHARLESTOWN, MASS.
CHEHALIS, WASH.
COLORADO SPRINGS, COL.
CRESTON, IA.
DALTON, GA.
DAYTON, O.
DECATUR, ALA.
DELRAY, MICH.
DETROIT, MICH.
HENDERSON, KY.
HUNTSVILLE, ALA.
IONIA, MICH.
IOWA CITY, IA.
LA CROSSE, WIS.
LOCKPORT, N. Y.
MARINETTE, WIS.
MARSHALLTOWN, IA.
MENOMINEE, MICH.
MILWAUKEE, WIS.
MT. PLEASANT, MICH.
NORFOLK, VA.
OWOSSO, MICH.
PARIS, KY.
PEKIN, ILLS.
PHILADELPHIA, PA.
RICH HILL, MO.
RICHMOND, IND.
ROCKFORD, ILLS.
SALT LAKE CITY, UTAH.
SOUTH HAVEN, MICH.
STURGIS, MICH.
TACOMA, WASH.
TALLADEGA, ALA.
TRINIDAD, COL.
TUSCALOOSA, ALA.
VALPARAISO, IND.
VANCOUVER, B. C.
VICTORIA, B. C.
WATERLOO, IA.

LACLEDE-CHRISTY CLAY PRODUCTS COMPANY,

ST. LOUIS, MO.

C. W. HUNT CO.,

WEST NEW BRIGHTON, NEW YORK.

NEW YORK CITY, 45 Broadway. ATLANTA, GA., 607 Rhodes Building.
CHICAGO, 1616 Fisher Building. RICHMOND, VA., State Bank Building.
SAN FRANCISCO, 865 Monadnock Building.

We Make a Specialty of Coal and Coke Handling Machinery.

Write for a List of the Gas Works in your neighborhood Equipped with our Machinery.

No. 1041. FITCHBURG GAS & ELECTRIC LIGHT CO. Coal is dumped into a pit under the car tracks, is hoisted with a Hunt Elevator, and taken to coal storage by an automatic railway.

Copy of our latest catalogue just off the press has been sent to every gas engineer in this country, and if you have not received one, please write us.

Sole Agents for MacDonald-Mann Quenching Chutes.

"THE MINER" GLOBE STREET LAMPS.

OVER FORTY YEARS IN USE THE WORLD OVER.

THE BEST STREET LAMPS for ALL KINDS OF GAS OR BURNERS.

This is only one of a Large Variety of Styles.

SEND FOR CATALOGUE.

THOS. T. W. MINER,
821 and 823 Eagle Avenue,
New York.

NO. 100 LAMP.

NOW ON SALE. NEW EDITION IN CLOTH COVERS.

COX'S LOW PRESSURE COMPUTER, - Price, $2.50
COX'S HIGH PRESSURE COMPUTER, - " 5.00

For Sale by AMERICAN GAS LIGHT JOURNAL,
42 Pine Street, New York City.

THE LIGHT, HEAT & POWER CORPORATION,
CONTRACTING ENGINEER
Electric Light and High Pressure Gas Plants. Equipment, Material and Supplies.
131 State Street, Boston, Mass.
Cable Address, "LIHEPOWCO." Code, LIEBER'S.

Alcohol, its Manufacture from Farm Products and De-Naturing. By F. B. WRIGHT.
Price, $1. *For Sale by*
A. M. Callender & Co., 42 Pine St., New York City.

Gas Engineer's Pocket-book, —BY— HENRY O'CONNOR.
Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50. For Sale by
A. M. Callender & Co., 42 Pine St., New York City.

ISBELL-PORTER COMPANY,

NEWARK, N. J.

FOWLER'S PATENT STAND PIPES FOR MACHINE OPERATED RETORT HOUSES.

BUILD YOUR HORIZONTAL 8'S WITH 8-FOOT ARCHES AND REDUCE THE COST OF SETTINGS AND BUILDING.

CONTRACTORS FOR

COMPLETE MECHANICALLY-OPERATED RETORT HOUSES.

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, 1910. New York City. Officers: President, Wm. H. Bradley, N. Y., City Secretary, A. B. Beadle, 29 West 39th street, N. Y. City.

Canadian Gas Association.—Annual meeting, June, 1911. ————. Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1910. New York City. Officers: President, C. R. Huntley, Buffalo, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, December. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, A. K. Quinn; Newport, R. I.; Secretary, Walter G. Africa, Manchester, N. H.

Illinois Gas Association.—Annual meeting, time, March, Chicago, Ills. Officers: President, A. S. Harrington, Chicago, Ill.; Secretary-Treasurer, C. B. Strohn, Elgin, Ill.

Illuminating Engineering Society.—Annual meeting, Baltimore, Md., Oct. 1911. Meetings of Sections, monthly. President, W. H. Gartley, Philadelphia, Pa.; Secretary, Preston S Millar, 29 W. 39th street, N. Y. City. Sections: New York: Secretary, Albert J. Marshall, 227 Fulton street. New England, Secretary, L. D. Gibbs 39 Boylston street, Boston, Mass. Philadelphia, Secretary, F. N. Morton, Broad and Arch streets Chicago, Secretary, T. R. Beebe, 157 Michigan avenue,

Indiana Gas Association.—Annual meeting, January 19, 1911, Fort Wayne, Ind. Officers: President, Carl H. Graf, Indianapolis; Vice-President. S. E. Mulholland; Secretary-Treasurer, Philmer Eves, Indianapolis Gas Company, Indianapolis, Ind.

Iowa District Gas Association.—Annual meeting, time, June, 1911, ————. Officers: President, Austin Burt, Waterloo, Ia.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ———— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. 9 to 12, 1910; Aboard Boat, "Georgian Bay." Officers: President, B. O. Tippy, Grand Rapids, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April 13, 14 and 15, 1911; St. Louis, Mo. Officers: President, R. J. Irvine Secretary and Treasurer, W. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1911: Boston. Officers: President, E. N. Wrightington, Boston; Secretary, Louis Stotz, 36 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May 16, 17 and 18, 1911; Pittsburgh, Pa. Officers: President, John M. Garard, Columbus, O, Secretary, T. C. Jones, Delaware, O. Editor Wrinkle Department, F. W. Stone, Ashtabula, O.

New England Gas Association.—Annual meeting, third Wednesday in February; Boston. Officers: President, W. H. Snow, Holyoke, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

Oklahoma Public Utilities Association.—Annual meeting, May 9, 10 and 11, 1911. Officers: President, E. C. Reynolds; Secretary, Galen Crow, Guthrie, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1910, Los Angeles, Cal. Officers: President, W. B. Cline, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 925 Franklin street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1911, Reading, Pa. Officers: President, J. H. Keppelman, Reading, Pa.; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

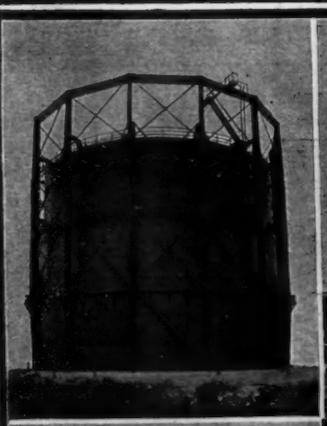
Society of Gas Lighting.—Annual meeting, December, 1910; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 1123 Broadway, New York.

Southern Gas Association.—Annual meeting, April 19-21, 1911, Montgomery, Ala. Officers: President, H. W. Frund, Salisbury, N. C.; Secretary-Treasurer, Jas. Ferrier, Rome, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. May, 1911, ———— Tex. Officers: President, W. B. Tuttle, San Antonio, Tex.; Secretary, H. B. Head, Stephensville, Tex.

Wisconsin Gas Association.—Annual meeting, May ————, 1911, Milwaukee, Wis. Officers: President, W. H. Winslow, Superior, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.

Directory of American Gas Companies, 1909. Price, $5.00. For Sale by A. M. Callender & Co., 42 Pine St., N. Y.



CRUSE-KEMPER CO.

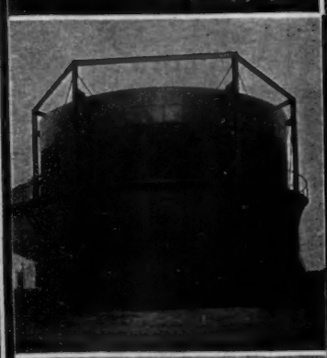
Main office and works, - Ambler, Pa.
New York office, - - 56 Pine St.

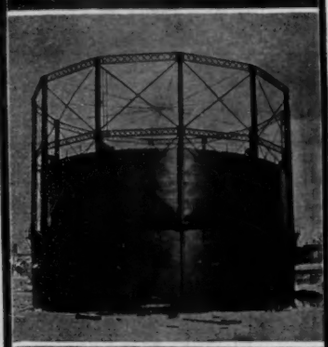
HOLDERS, TANKS, PURIFIERS,
SCRUBBERS, CONDENSERS,
STRUCTURAL STEEL AND PLATE WORK.

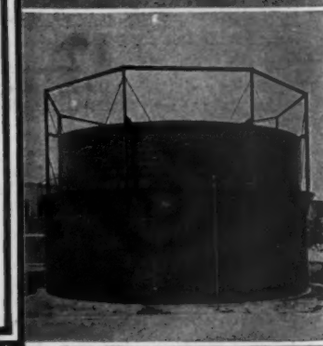
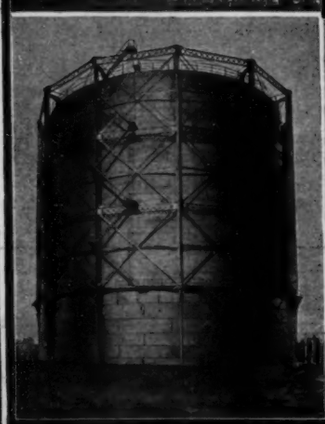
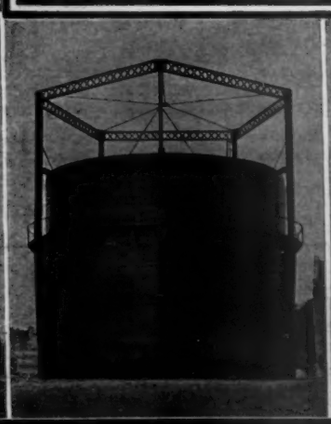
Some of the best gas engineers of the United States have passed on our designs and workmanship, resulting this year in the following contracts:

GOLDSBORO, N. C.		(completed)	30,000 c. f.
AMHERST, MASS.		(completed)	30,000
BABYLON, L. I.			31,000
GLASSBORO, N. J.		(completed)	50,000
ATLANTIC HIGHLANDS, N. J.			50,000
PORT JERVIS, N. Y.			75,000
HAMMONTON, N. J.		(completed)	100,000
RALEIGH, N. C.			150,000
COATESVILLE, PA.	(Am. Gas)	(completed)	150,000
PLEASANTVILLE, N. J.		(completed)	200,000
SHAMOKIN, PA.			200,000
HARRISBURG, PA.	(U. G. I.)		1,500,000
NEW HAVEN, CONN.*			3,000,000

*To be completed summer 1911.





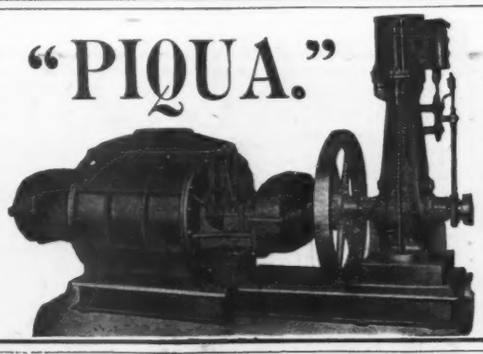
GAS EXHAUSTERS AND BLOWERS.

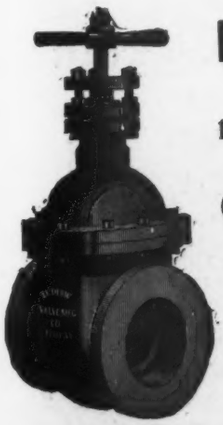
We have a full line of sizes for all standard pressures. The design, material and workmanship is A-1. Prompt Delivery and Reasonable Prices. WHY NOT give us YOUR requirements?

THE PIQUA BLOWER CO.,

PIQUA, OHIO.

"PIQUA."





THE

Ludlow Valve Mfg. Co.,

TROY, N. Y., U. S. A.

Double and Single Gate Valves, ¼" to 72",

—FOR—

Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

QUINTARD IRON WORKS CO.,

Foot of Twelfth Street and East River, New York,

BENCH WORK,
CONDENSERS,
SHAVING SCRUBBERS,
CAST IRON FLANGED PIPE,
RIVETED STEEL PIPE.

FREDERICK W. FLOYD, Engineer.

ESTABLISHED 1856.

HENRY MAURER & SON,

Manufacturers of

High Grade Firebrick, Blocks, Tiles,

ETC.,

Works: Maurer, N. J. Office: 420 E. 23d St., N. Y. City.

GAS BENCH CONSTRUCTION CO.,

ST. LOUIS, MO.

COAL GAS BENCHES.

HORIZONTAL.——INCLINED.——VERTICAL.

WE HAVE ALL TYPES and SIZES IN SUCCESSFUL OPERATION.
BUILT AFTER OUR OWN DESIGNS and WITH OUR OWN MATERIALS.

WATER GAS LININGS, CHECKERBRICK.

ALL WORKMANSHIP, MATERIAL AND RESULTS GUARANTEED.

L. J. MONTGOMERY,

Manufacturers' Representative

—AND—

PURCHASING AGENT

FOR THE GAS TRADE.

150 Nassau St.,

NEW YORK.

LONG DISTANCE TELEPHONE, 3342 BEEKMAN.

All kinds of novelties for advertising gas for lighting, cooking and heating. For commercial standing refers by permission to this Journal.

Practical Handbook on

GAS ENGINES,

With Instructions for Care and Working of the Same,

By G. LIECKFELD, C.E.

Translated with Permission of the Author, By GEO. M. RICHMOND, M.E.

Price, $1.

For Sale by

AMERICAN GAS LIGHT JOURNAL,
42 Pine St., New York City.

STANDARD REDUCTION FACTORS for GASES,

By Helon Brooks MacFarland, B.S., M.M.E.

Price, $1.50. *For Sale by*

A. M. Callender & Co., 42 Pine St., New York City.

ELECTRIC GAS LIGHTING.

How to install electric gas igniting apparatus, including the jump spark and multiple systems for use in houses, churches, theaters, halls, schools, stores or any large building. Also, the care and selection of suitable batteries, wiring and repairs.

By H. S. NORRIE.

Price, 50 cents. Orders may be sent to

A. M. CALLENDER & CO., 42 PINE ST., N. Y. CITY.

Alcohol, its Manufacture from Farm Products and De-Naturing. By F. B. WRIGHT.

Price, $1. *For Sale by*

A. M. Callender & Co., 42 Pine St., New York City.

DRAKES
LIMITED,
HALIFAX, ENGLAND.

GAS ENGINEERS
AND CONTRACTORS.

IRONCLAD
TRADE MARK

Even if an Ironclad, Cast Iron, Dry Gas Meter cost twice as much as the next best meter, it would be the most economical for you to use, because its maintenance expense is much below any other meter.

It has very large capacity, therefore less wear on working parts. It is easily set, most accessible, and has long life under any condition.

THE 100 PER CENT. METER

Either Straight or Circular Reading Registers.

CATALOG 100

Pittsburg Meter Co.

Main Office and Works:
East Pittsburg, Pa.

New York, 149 Broadway.
Chicago, 256 Madison Street.
Kansas City, 6 West 10th Street.
Seattle, 8th and Madison Streets.
San Francisco, 149 New Montgomery St.

Manufacturers of Gas Meters and Water Meters.

PUBLIC LIGHTING TABLES FOR SEPTEMBER, 1910.

[COMMUNICATED BY THE AMERICAN METER COMPANY.]

Day of Week.	Table No. 1. FOLLOWING THE MOON			Day of Week.	Table No. 2. NEW YORK CITY. ALL NIGHT LIGHTING.		
	Date.	Light.	Extinguish.		Date.	Complete Lighting in 1 Hour.	Complete Extinguishing in 50 Minutes.
						From Time Given.	
		P.M.				P.M.	A.M.
Thu.	1	7.10	4.30 A.M.	Thu.	1	6.27	3.57
Fri.	2	7.10	4.30	Fri.	2	6.27	3.57
Sat.	3	7.10 N.M.	4.30	Sat.	3	6.17	4.07
Sun.	4	7.00	4.30	Sun.	4	6.17	4.07
Mon.	5	7.00	4.30	Mon.	5	6.17	4.07
Tue.	6	7.00	4.30	Tue.	6	6.17	4.07
Wed.	7	7.00	4.30	Wed.	7	6.12	4.07
Thu.	8	7.50	4.30	Thu.	8	6.12	4.07
Fri.	9	8.20	4.30	Fri.	9	6.12	4.07
Sat.	10	8.50	4.30	Sat.	10	6.02	4.17
Sun.	11	9.30 F.Q.	4.40	Sun.	11	6.02	4.17
Mon.	12	10.10	4.40	Mon.	12	6.02	4.17
Tue.	13	11.10	4.40	Tue.	13	6.02	4.17
		A.M.					
Wed.	14	12.10	4.40	Wed.	14	6.02	4.17
Thu.	15	1.20	4.40	Thu.	15	6.02	4.17
Fri.	16	2.30	4.40	Fri.	16	6.02	4.17
Sat.	17	No L.	No L.	Sat.	17	5.52	4.27
Sun.	18	No L. F.M.	No L.	Sun.	18	5.52	4.27
Mon.	19	No L.	No L.	Mon.	19	5.52	4.27
Tue.	20	6.30 P.M.	8.10 P.M.	Tue.	20	5.52	4.27
Wed.	21	6.30	8.40	Wed.	21	5.47	4.27
Thu.	22	6.30	9.10	Thu.	22	5.47	4.27
Fri.	23	6.30	9.50	Fri.	23	5.47	4.27
Sat.	24	6.30	10.30	Sat.	24	5.37	4.37
Sun.	25	6.20 L.Q.	11.30	Sun.	25	5.37	4.37
Mon.	26	6.20	12.30 A.M.	Mon.	26	5.37	4.37
Tue.	27	6.20	1.40	Tue.	27	5.27	4.37
Wed.	28	6.20	2.40	Wed.	28	5.32	4.37
Thu.	29	6.20	4.50	Thu.	29	5.32	4.37
Fri.	30	6.20	4.50	Fri.	30	5.32	4.37

BY USING

THE SAFEST, SIMPLEST, STRONGEST AND MOST SATISFACTORY

PREPAYMENT METERS.

TRY THEM

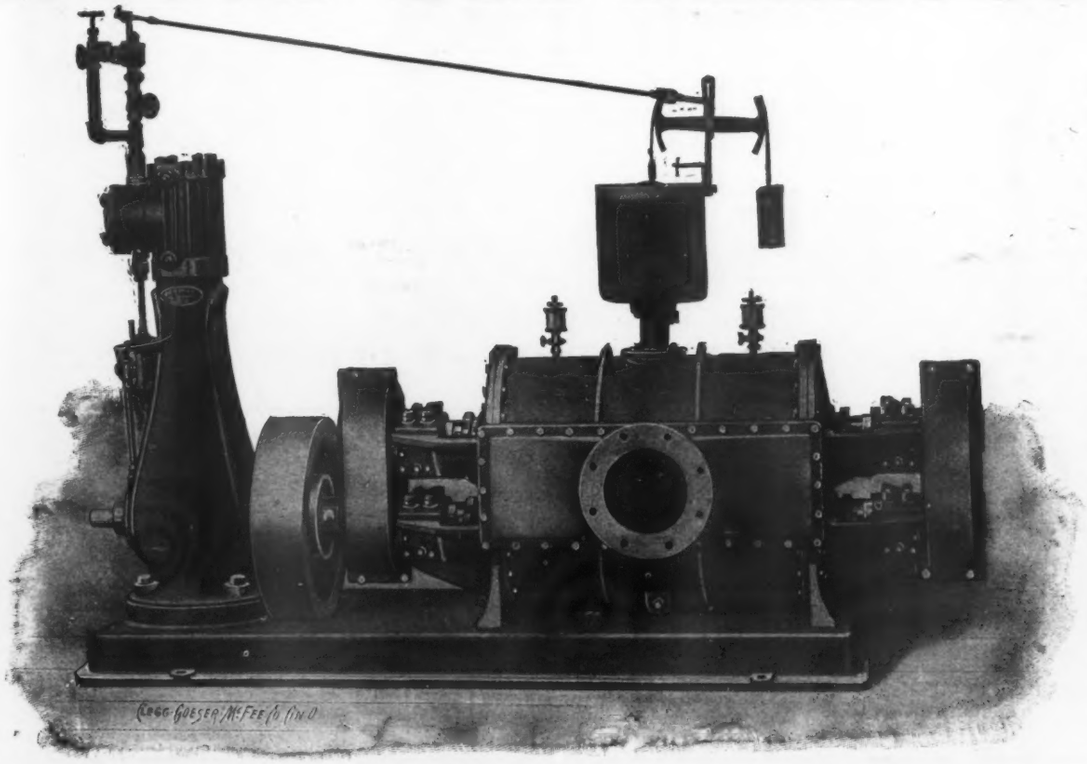
AND YOU WILL BE CONVINCED OF THEIR EXCELLENCE.

NEW YORK IMPROVED METER CO.,

306-310 EAST 47TH ST., NEW YORK CITY.

PACIFIC COAST REPRESENTATIVES:
NORTHWEST GAS EQUIPMENT COMPANY, PORTLAND, ORE.

ROOTS' GAS EXHAUSTERS.



Sizes for any required capacity.

Self-oiling, adjustable bronze bearings.

Most perfect and sensitive Governor.

Write for Catalogue.

P. H. & F. M. ROOTS COMPANY,

HOME OFFICE:
Connersville, Ind.

NEW YORK OFFICE:
120-122 Liberty St.

CHICAGO OFFICE:
1547 Marquette Bldg.

SEND FOR POCKET EDITION OF "ENGINEERS' PRACTICAL REFERENCE BOOK."

BOOKS FOR GAS MEN.

LIQUID AND GASEOUS FUELS,
By Vivian B. Lewes.
334 pages. . . . . Price, $2.

THE GAS ENGINE,
By Forrest R. Jones. 447 pages and 142 cuts. Price, $4.

HEATING,
By W. J. Baldwin.
Price, ... $2.50.

PUBLIC LIGHTING BY GAS and ELECTRICITY, By W. J. Dibdin. 528 pages. About 150 illustrations. Price, . . $8.

AUDEL'S GAS ENGINE MANUAL.
469 pages. 156 illustrations.
Price, ... $2.

GAS MANUFACTURE,
By W. J. A. Butterfield.
Price, ... $2.50.

HANDBOOK ON GAS ENGINES,
By G. E. Lieckfeld, C.E. Translated by George M. Richmond, M.E. Price, $1.

GAS AND GAS WORKS,
By Hughes and O'Connor.
Price, ... $2.50.

CHEMISTRY OF GAS MANUFACTURE,
By Harold M. Royle, F.C.S.
Price, ... $4.50.

MODERN COKING PRACTICE,
By T. H. Byrom and J. E. Christopher.
168 pages. Illustrated. . . Price, $3.50.

HEAT, ENERGY AND FUELS,
By Oskar Nagel. 306 pages and 118 illustrations. Price, $3.

PRODUCER GAS AND GAS PRODUCERS,
By Samuel S. Wyer. 295 pages. Price, $4.

THE MACBETH CALCULATOR for the Solution of Every Illumination Calculation. Price, . . . $6.50.

RADIATION, LIGHT AND ILLUMINATION, By Dr. C. P. Steinmetz.
300 pages. 127 illustrations. Price, $3.

GAS MANUFACTURE FOR STUDENTS,
By John Hornby.
Price, ... $1.50.

COAL TAR AND AMMONIA,
By George Lunge.
Price, ... $15.

GAS ANALYST'S MANUAL,
By Jacques Abady.
Price, ... $6.50.

SELF-INSTRUCTION FOR STUDENTS,
Elementary, Advanced, Constructional.
Price, ... Each, $1.50.

GAS PIPING AND GAS LIGHTING,
By W. P. Gerhard.
310 pages. . . . . Price, $3.

GAS POWER,
By F. E. Junge, M.A., C.E., M.E.
548 pages. . . . . Price, $5.

GAS, GASOLINE AND OIL ENGINES,
Including Producer Gas Plants.
By Gardner D. Hiscox, M.E. Price, $2.50.

PRACTICAL TESTING OF GAS AND GAS METERS,
By C. H. Stone. Price, ... $3.50.

GAS ENGINE THEORY AND DESIGN,
By A. C. Mehrtens.
256 pages. 241 illustrations. Price, $2.50.

THE DISTRIBUTION OF GAS,
By Walter Hole.
Second Edition. Illustrated. Price, . $6.

MODERN RETORT SETTINGS,
By G. P. Lewis.
Price, ... $1.50.

ART OF ILLUMINATION,
By Dr. Louis Bell.
Price, ... $2.50.

GAS COMPANIES' BOOKKEEPING.
By Brearley and Taylor.
Price, ... $4.50.

We will be Glad to Furnish Any Engineering Book.
SEND CHECK, DRAFT, POST OFFICE or EXPRESS MONEY ORDER

AMERICAN GAS LIGHT JOURNAL, - - 42 PINE STREET, NEW YORK CITY.

BRAY BURNERS HAVE BEEN USED FOR MORE THAN FORTY YEARS.

In that time they have been recommended and used by the leading gas experts, endorsed by the U. S. Government Inspectors of Gas, as well prominent State Inspectors.

To-day the Bray is the only high-grade, absolutely reliable open flame burner on the market.

W. M. CRANE COMPANY,

16, 18 and 20 West 32d Street, New York,

SOLE AGENTS FOR GEO. BRAY & CO., LEEDS, ENGLAND.

GEORGE ORMROD, Pres. & Treas. JOHN D ORMROD, Supt.
J. G. EBERLEIN, Secretary.

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA.

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

BRISTOL'S RECORDING INSTRUMENTS
FOR PRESSURE, TEMPERATURE AND ELECTRICITY.

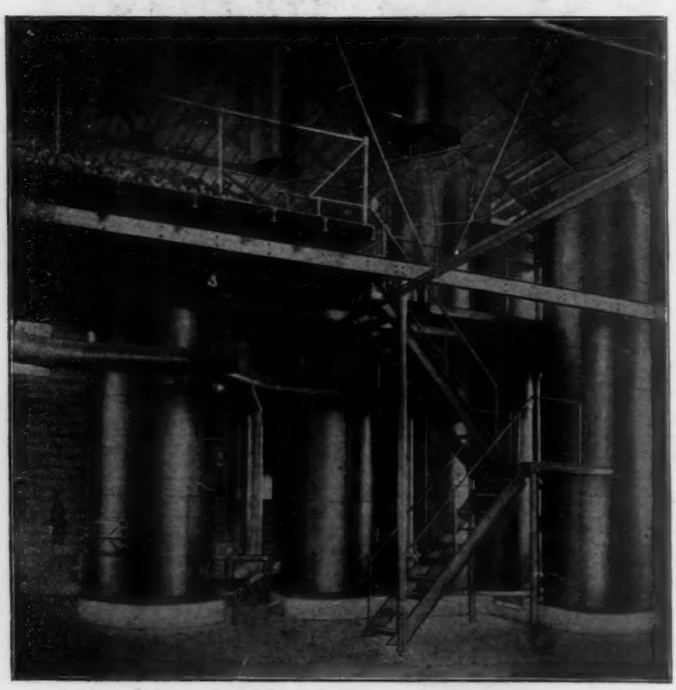
Most Complete Line of Recording Instruments in the world.

Write for new Illustrated Index of Bristol Instruments, with more than fifty large illustrations.

THE BRISTOL COMPANY,
WATERBURY, CONN.

BRANCH OFFICES:
NEW YORK. PITTSBURG. CHICAGO.

WATER GAS APPARATUS.



WATER GAS APPARATUS.—400,000 cu. ft. per day capacity.

WE HAVE HAD 36 YEARS' EXPERIENCE IN OPERATING AND BUILDING WATER GAS WORKS. :: :: ::

Old Water Gas Works Rebuilt and Made Up to Date.

Correspondence Solicited.

GAS ENGINEERING CO.,

FRANK D. MOSES, Pres.,

TRENTON, N. J.

PRACTICAL HANDBOOK ON GAS ENGINES, WITH INSTRUCTIONS FOR CARE AND WORKING OF THE SAME.

By G. LIECKFELD, C.E. Translated with Permission of the Author, by GEORGE M. RICHMOND, M.E. Price, $1.

For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

AN ECONOMICAL EQUIPMENT,
A "BROWNHOIST" LOCOMOTIVE
CRANE AND GRAB BUCKET.

The illustration shows equipment in use at Malden and Melrose Gas Light Company.

The Brown Hoisting Machinery Co.,
CLEVELAND, O.

CABLE ADDRESS:
WILDOLPH, NEW YORK.

WILLIAM W. RANDOLPH, M.E.,
CONSULTING ENGINEER,
FORMERLY CHIEF ENGINEER AND VICE-PRESIDENT OF
HUMPHREYS & GLASGOW, INC.

165 BROADWAY,
NEW YORK CITY.

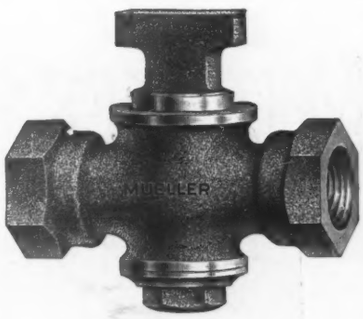
EXAMINATION AND VALUATION OF PUBLIC UTILITY AND POWER CORPORATIONS.
ADVICE AS TO CONSTRUCTION AND MANAGEMENT.

Heavy Bodies and Extra Heavy Ends.

Mueller High Pressure Gas Cocks are provided with heavy walls and the ends are not cored out under the hexes. They have an ample supply of metal to give them strength to resist the strain of fitting in. They are made of Mueller Red Brass.

Mueller High Pressure Gas Cocks are furnished in all patterns and have round openings or drilled solid keys. They are Unconditionally Guaranteed.

Mueller Extra Heavy
High Pressure
Curb Cock.



D-21051.

TRADE MARK
MUELLER
REGISTERED

Works and General Offices,
DECATUR, ILL., U. S. A.
West Cerro Gordo St.

H. MUELLER MFG. CO.

Eastern Division,
NEW YORK, N. Y., U. S. A.
254 Canal St. (cor. Lafayette).

FIELD'S ANALYSIS
For the Year 1908.

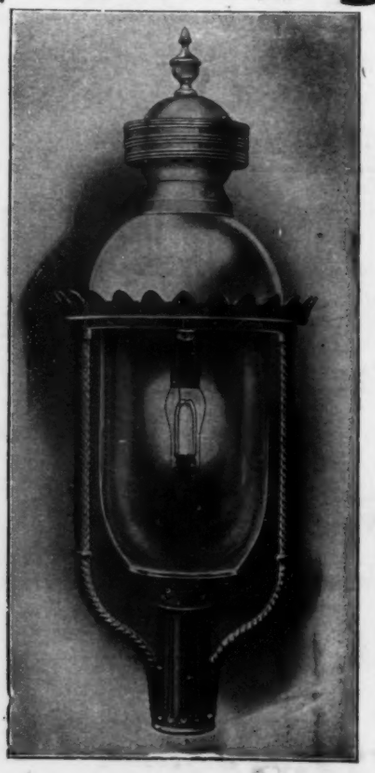
An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland. Being the 40th Year of Publication.

PRICE, $5.

For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

NEW YORK, 318 West 42d Street.
BOSTON, 820 Beacon Building.
PHILADELPHIA, Broad and Arch Streets.
ST. LOUIS, 712 Roe Building.
CHICAGO, 218 La Salle Street.
SAN FRANCISCO, 512 Oak Street.

WELSBACH STREET LIGHTING COMPANY



OF AMERICA

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.

No. 38.

WELSBACH
MULTI-FLEX
GAS ARC

OUTSIDE DISPLAY LIGHTING:

The Gas Company's Opportunity.

Ninety per cent. of the new outdoor display lighting installations are put up by business men for their advertising value. It is a strictly business proposition, and those who spend their good money for it want to get the most for their money, just as in any other business deal.

The Welsbach Multi-Flex Lamp will give **better** effects than are generally secured by other means, and at **one-half the cost.**

Is there any business man whom these arguments will not attract?

Then put up the lamps and **prove** it to him. The business is yours if you will go after it with **confidence in your proposition.**

We furnish and guarantee the Lamp. That is all you need to back up your own confidence. Our Illuminating Engineering Laboratories are ready to assist you if you are in doubt as to the best method of laying out the installation.

Our new lamp posts for either one or two Multi-Flex Lamps forms a complete unit; shipped ready to connect up.

NOW is the time to start your fall campaign.

Welsbach Company.

Factories:

Gloucester, N. J.——————Columbus, O.

THE UNITED GAS IMPROVEMENT COMPANY,

PHILADELPHIA.

BUILDERS OF

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

ACCURATE MEASUREMENT

OF

AIR AND STEAM SUPPLY

(PATENTED),

AFFORDING { PERFECT CONTROL OF GENERATOR FIRE CONDITIONS.

PRODUCING { UNIFORM RESULTS. HIGHEST EFFICIENCIES.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES, FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

GEROULD'S IMPROVED RETORT CEMENT

A Cement of great value for patching retorts, putting on mouthpieces, making up all bench-work joints, lining blast furnaces and cupolas. This cement is mixed ready for use. Economic and thorough in its work. Fully warranted to stick.

Price List, f.o.b. NEW CASTLE, PA.

In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD,
29 North Mill St., New Castle, Pa.

RESISTS DECARBONIZATION.

Best Cement for Patching, Repairing, Glazing Retorts, Making up Bench Work, Etc.

KRATER-DINAS RETORT CEMENT.

In bags of 150 lbs. In barrels of 330 lbs. For particulars and prices apply to

SOLE IMPORTER,
ERNST STRASSBURGER,
2630 Lincoln Ave., Chicago, Ills.

"BEST BY TEST."

ESTABLISHED 1868.

L. N. RANCKE, V. Pres. & Mgr. E. L. RIEHA, Engineer.

BALTIMORE RETORT & FIRE BRICK COMPANY.

COAL GAS BENCHES.

HORIZONTAL RETORTS
INCLINED RETORTS.
VERTICAL CHAMBERS.

WALDO BROS., 102 Milk St., BOSTON, MASS.,
NEW ENGLAND AGENTS.

THE PARKER-RUSSELL MINING AND MFG. CO.,

Saint Louis, Missouri. New York Office, 45 Broadway.

GAS RETORT BENCHES, Horizontals, Verticals, Inclines.
Longest Life---Largest Output per Retort---Lowest Fuel Results---Greatest Ease of Operation.
WATER GAS LININGS.
STOKING MACHINES, FIDDES-ALDRIDGE DISCHARGING CHARGER.
WOODALL-DUCKHAM, CONTINUOUS SYSTEM OF VERTICAL RETORTS.
LARGE STOCK OF RETORTS AND SETTINGS ON HAND.
ALL OUR WARES ARE MANUFACTURED AT OUR OWN PLANT FROM CLAYS MINED FROM OUR OWN MINES.
All Contracts Made as of St. Louis. Correspondence Solicited.

JOHN DELL,
President and General Manager.

MISSOURI FIRE BRICK CO.,

ESTABLISHED 1882.

MANUFACTURERS OF

Gas Retorts, Bench Settings, Fire Brick, Cupola Linings, Etc.

We are the **Exclusive Agents** *for the* **Mitchell Patent Benches,** *Constructed with Half or Full Depth Furnaces, to Burn either Coal or Coke, and Arranged for Front or* **Rear Clinkering.** *The* **Mitchell** *is the* **Original Coal Firing Bench.** *We also Erect Plain Benches with* **One** *to* **Six Retorts.**

YOUR CORRESPONDENCE IS RESPECTFULLY SOLICITED.

City Office: *411 Olive Street, Continental Bank,* ST. LOUIS, MO.

TAR BURNERS FOR BOILERS and COKE OVEN BENCHES.

WRITE FOR CATALOGUE.

HUNDREDS IN SUCCESSFUL OPERATION.

W. N. BEST,
ENGINEER IN CALORIC,
11 BROADWAY, - - - - NEW YORK CITY.

THERE IS NOTHING BETTER THAN THE BEST.

EXPERT INSPECTION of Holders and Other Structures During Construction.
ECONOMIC DESIGN of Steel Structures, Reinforced Concrete, Masonry and Foundations.
CHAMBERS & HONE, Consulting Engineers. . . . . 1 Liberty Street, New York City.

Bronder Patent Stoking Machinery.

Three-Scoop and Three-Rake Charging and Discharging Machines are operating in New York, Newark, N. J., Philadelphia, Worcester, Mass., Mt. Vernon, N. Y., Toronto and Montreal, Canada, Detroit, Seattle, Rochester and St. Louis.

Four-Scoop and Four-Rake Charging and Discharging Machines are operating in Detroit, Mich., and Cincinnati, Ohio. These are the only machines that will draw or charge simultaneously 3 or 4 retorts (vertically) and handle from 42 to 60 retorts in from 25 to 30 minutes, lid opening and closing and filling of furnaces included.

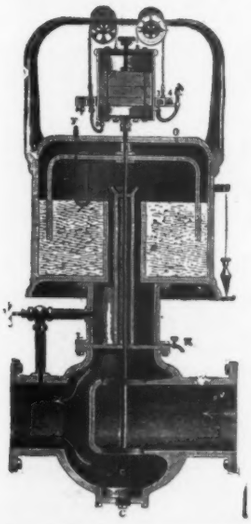
Hot Coke Conveyor, Quencher and Steam Exhauster, operating in Toronto, Canada, working in water-sealed flue, rollers being protected from heat and grit.

COAL CRUSHERS, CONVEYORS AND BINS. TURNTABLES FOR MACHINES.

Labor-Saving Machines for Handling Coal and Coke from Coal Cars to Coke Yard or Bins. Coke Screening and Measuring Plants a Specialty.

G. A. BRONDER,
Contracting Engineer and Builder,
229 BROADWAY, NEW YORK.

CONNELLY IRON SPONGE AND GOVERNOR CO.,



Automatic, Balance, High Pressure and Service Governors,
Unison Telemetric Pressure Gauge,
Iron Sponge, Purifying Material for Gas Purification, Manufacturers of Jones Jet Photometers, The National Smoke and Ammonia Helmet, Sulphur Testers, High and Low Pressure House Governors.

Wide Experience in High Pressure Installation and Extension.

PACIFIC COAST AGENT: VAN E. BRITTON, SAN FRANCISCO, CAL.

50 CHURCH ST., NEW YORK CITY.
295 WEST 22D ST., CHICAGO, ILLS.

THE FULTON GAS PRESSURE GOVERNORS

For Artificial or Natural Gas.
For District or Individual Service.

Our Improved **Duplex Sensitive Governor** for district service will reduce high pressure gas to inches of water without variation. Absolutely safe and reliable. No complicated mechanism to get out of order. No auxiliary regulators or other devices to assist the main governor required. The most simple and perfect governor ever placed on the market. We also manufacture Holder Governors, Compressor Governors and Individual Service Governors for any inlet and outlet pressure.

More than 20 years' experience with the largest gas companies. Send for Catalog.

THE CHAPLIN-FULTON MFG. CO.,
28-34 PENN AVE., PITTSBURCH, PA.

VAN E. BRITTON, Pacific Coast Agent, Monadnock Bldg., San Francisco, Cal.

FIELD'S ANALYSIS FOR THE YEAR 1908.

PRICE, $5. FOR SALE BY
AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

COAL TAR AND AMMONIA,

By GEORGE LUNGE, PH.D. Third and Enlarged Edition.
Price, $15. For Sale by
AMERICAN GAS LIGHT JOURNAL, 42 Pine St., New York City.

BERWIND-WHITE COAL MINING COMPANY'S

Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Arcade Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully Prepared.
For Gas Making or
Heavy Steaming .

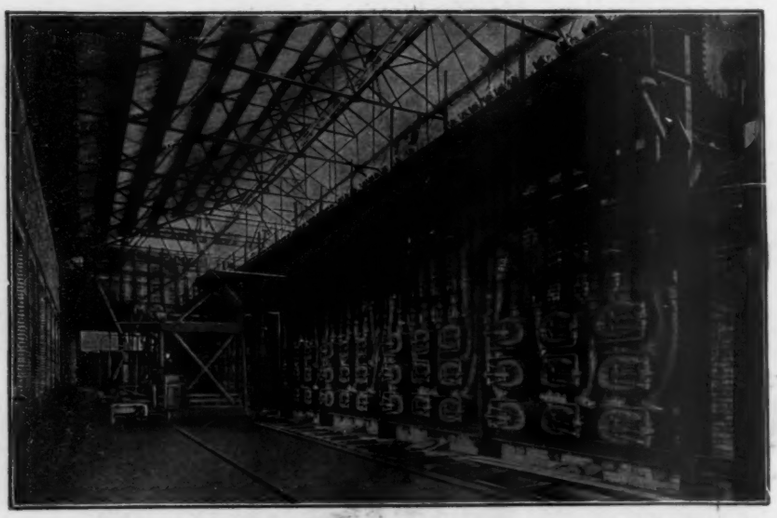
A. C. M. AZOY,
General Agent and Manager Gas Coal Department,
No. 1 Broadway, New York.

FRED BREDEL COMPANY,

FRED BREDEL, C.E., President. MILWAUKEE, WIS.

DESIGNERS AND BUILDERS OF COAL GAS WORKS AND APPARATUS.

BREDEL Recuperative Benches with Chamber Recuperator; all sizes, either Horizontal or Inclines.



Retort House with 20 Benches of 9's, Charging and Drawing Machines, Hydraulic Coke Conveyor. Erected for the Richmond City Gas Works. ALL OUR OWN SYSTEM.

Our Benches use less fuel and last longer than any other bench, without exception.

NAPHTHALENE EXTRACTOR-CONDENSERS,
NAPHTHALENE WASHERS,
TAR WASHERS,
AMMONIA WASHERS,
COOLERS,
PURIFIERS, AMMONIA STILLS,
GAS ENRICHING PLANTS,
RETORT HOUSES, STAGE FLOORS,
TURN TABLES.

BREDEL-FOULIS DISCHARGING MACHINE.

SOLE AGENTS FOR

ARROL-FOULIS CHARGING MACHINE, and
FROHNHAUSER COKE CONVEYOR.

Complete Gas Purifying Plants to use in conjunction with high percentage Sulphur Coal. Patented System in Actu ! Operation.

PETER YOUNG, President.
Works.
LOCKPORT STATION, PA.

ESTABLISHED 1864.

JAMES GARDNER, JR., CO.,

Successor to WILLIAM GARDNER & SON.

N. A. YOUNG, Secretary and Treasurer.
Address all communications to
JAMES GARDNER, JR., CO., Bolivar, Pa.

Fire Clay Goods for Gas Works.

The "Gas World" Analyses of Municipal Gas Accounts, FOR 1908-9,
AND
The "Gas World" Analyses of Gas Companies' Accounts, FOR 1908.

EVERY GAS ENGINEER AND MANAGER SHOULD HAVE A COPY OF THESE INVALUABLE AND UP-TO-DATE WORKS.

Price, $4 each. For Sale by AMERICAN GAS LIGHT JOURNAL, 42 Pine Street, New York City.

KELLER ADJUSTABLE COKE CRUSHER.

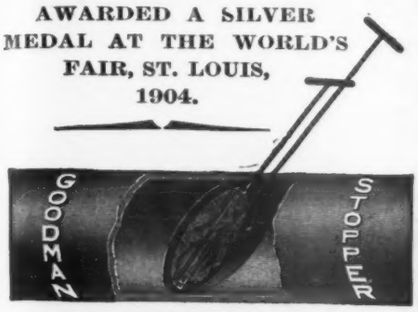
Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,

Columbus, Ind.

Correspondence Solicited.

AWARDED A SILVER MEDAL AT THE WORLD'S FAIR, ST. LOUIS, 1904.



AGENTS.

Pacific Coast—VAN E. BRITTON, 269 Monadnock Building, San Francisco, Cal.

Great Britain—PARKER & LESTER, Old Kent Road, London.

MANUFACTURED BY

SAFETY GAS MAIN STOPPER CO.,

257-263 East 133d Street,

NEW YORK CITY.

PATENTS, TRADE MARKS, COPYRIGHTS.

ROYAL E. BURNHAM,

Solicitor of Patents and Counsellor in Patent Causes.

833 Bond Building, Washington, D. C.

Send for Pamphlet on Patents.

S. PEMBERTON HUTCHINSON, President. H. C. ADAMS, 1st Vice President. CHAS. F. GODSHALL, 2d Vice-Pres. & Treas. HENRY WHARTON, Secretary. C. B. NICHOLS, Assistant Secretary.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J., WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas-giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

GAS MAINS—SERVICE PIPES.

Their installation for High or Low Pressure is the work in which we have specialized for years. Because of our Facilities and Experience, many Gas Companies prefer to contract with us for such work, rather than to execute it themselves. It proves to be as cheap in the end. We solicit inquiries.

Telephone Connection.

SULLIVAN BROS.,
11 Main St., Flushing, N. Y.

JOHN CABOT, President. GEO. D. CABOT, Secretary.

1412-1428 Adams Street, Hoboken, N. J.

PURIFIER AND SCRUBBER TRAYS

Church's Patent Trays,

Reversible; Strongest; Most Easily Repaired

We also Supply the Cheapest and Strongest

Reversible Bolted Trays

Special Trays for Iron Oxide in Either Style

GAS TAPPING MACHINES

—FOR—

Drilling and Tapping Pipe under Pressure

WITHOUT ANY ESCAPE OF GAS.

They are Strong and Compact.

Size of Combination Drills and Taps ¾ to 4-inch.

Machines Sent to any Gas Company for Thirty Days' Trial.

Send for Circulars.

Geo. Light,
DAYTON, O.

AMERICAN GAS ENGINEERING PRACTICE,

A HANDBOOK FOR ALL ENGAGED IN THE INDUSTRY,

Comprising Many Details Not Heretofore Published,

By M. NISBET LATTA, C.E.,

PART I. WATER GAS MANUFACTURE. The Generator. The Carburetter. The Superheater. Wash Box and Tar. Scrubbers. Condensers. Purifiers. Exhausters. Station Meters. Holders. Details of Works' Operation.

" II. GAS DISTRIBUTION. Naphthaline. Mains. Services. Consumers' Meters. Pressure. House Piping. Appliances.

" III. GENERAL TECHNICAL DATA. Properties of Gases. Steam. Mathematical Tables. Conversion Factors. Pipe and Miscellaneous Data.

Price, $4.50. For Sale by

A. M. CALLENDER & CO., 42 PINE ST., NEW YORK CITY.

DAVIS & FARNUM MANUFACTURING CO.,

Waltham, Mass.

GAS HOLDERS

Steel Tanks for Naptha Storage, Machinery for Coal and Water Gas Plants.

H. M. BYLLESBY & COMPANY

(INCORPORATED),

GAS ENGINEERS,

DESIGN, CONSTRUCT AND OPERATE
COMPLETE COAL, WATER AND CRUDE OIL GAS PLANTS.

EXAMINATIONS AND REPORTS.

218 LA SALLE STREET, CHICAGO.

Oklahoma City, Okla. Mobile, Ala. San Diego, Cal.

HENRY I. LEA,

CONSULTING GAS ENGINEER.

DESIGN---CONSTRUCTION---MANAGEMENT

OF

GAS PLANTS

FOR

CITY SUPPLY---
POWER DEVELOPMENT---
INDUSTRIAL HEATING.

EXAMINATIONS AND REPORTS.

1519 PEOPLES GAS BLDG., CHICAGO.

FIELD'S ANALYSIS FOR THE YEAR 1908.

An Analysis of the Principal Gas Undertakings in England, Scotland and Ireland; being the 40th year of publication. Compiled and arranged by JOHN W. FIELD, Sec'y and Gen. Mgr. of The Gas Light and Coke Company, London. Price, $5. For Sale by

AMERICAN GAS LIGHT JOURNAL, 42 Pine St., N. Y. City.

ALEX. C. HUMPHREYS, President
EMILE GUILLAUDEU, Treasurer.
ROBT. O. LUQUEER, Secretary.
HOWARD E. WHITE, General Counsel.

EUROPEAN CORRESPONDENTS.
HUMPHREYS & GLASGOW,
LONDON. — BRUSSELS.

HUMPHREYS & GLASGOW, INC.,

CONSULTING ENGINEERS.

ADVICE AS TO EXTENSION, MANAGEMENT AND RECONSTRUCTION OF GAS AND ELECTRIC PLANTS.

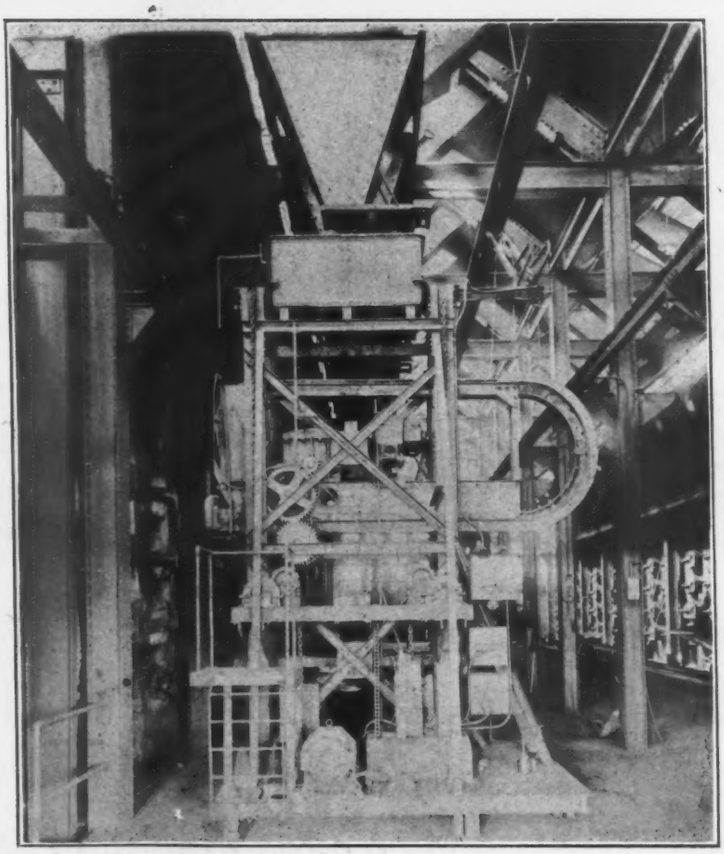
COMPLETE EXAMINATIONS MADE. PROPERTIES PURCHASED.

CITY INVESTING BUILDING, 165 BROADWAY, NEW YORK.

Binder
FOR THE
Journal.
PRICE,
$1.

For Sale by
A. M. CALLENDER & CO.,
42 Pine Street,
New York City.

THE BARTLETT HAYWARD CO.
ENGINEERS & FOUNDERS.
BALTIMORE. NEW YORK.
COAL & WATER GAS PLANTS
GAS HOLDERS



DISCHARGING MACHINE.

Western Representative—W. A. BAEHR, Peoples Gas Building, Chicago.

DIDIER-MARCH COMPANY,

Hudson Terminal Building,

WORKS:
Keasbey, Perth Amboy, N. J.

30 Church Street,
NEW YORK, N. Y.

DESSAU SYSTEM OF VERTICAL RETORTS,

The Only System in Successful Operation

PLATFORM ON TOP OF DESSAU BENCHES.

First Installation in the United States of America,

PROVIDENCE, R. I., 18 BENCHES, 180 RETORTS,

Complete, with

Retort House, Coal and Coke Handling Machinery and Storage Bins.

HORIZONTALS AND INCLINES OF APPROVED TYPES.

Correspondence Solicited. **FREDERICK J. MAYER, General Manager.**

The National Chamber Oven Co.,

ENGINEERS AND BUILDERS OF COMPLETE COAL CARBONIZATION PLANTS.

EXCLUSIVE BUILDERS IN THIS COUNTRY OF THE "KLONNE" CHAMBER OVENS AND RETORTS, WHICH HAVE PROVEN REPEATEDLY AND ARE CONCEDED TO BE SUPERIOR TO ANY OTHER SYSTEM OF COAL CARBONIZATION, AS NOTED BY THE FOLLOWING FIGURES GIVING COMPARATIVE RESULTS OF DIFFERENT METHODS OF MAKING GAS, OBTAINED FROM ACTUAL TESTS AT THE KONIGSBERG GAS WORKS.

	Direct-Fired Settings of Seven Horizontal Retorts (1902).	Settings of Nine Inclined Retorts (1902).	Settings of Four Large Inclined Chambers (1908-9).
Number of units	32 settings	24 settings	6 Settings
Make per 24 hours (cubic feet)	1,356,000	2,719,000	1,589,000
Make per 24 hours per 100 square feet of area of ground covered by buildings and plant (cubic feet)	10,827	12,102	19,174
Number of shifts per day and duration	Two (eight hours)	Three (eight hours)	One (nine hours)
Make of gas per man employed, including charging, coke removal, clinkering and charging producers, cleaning ascension pipes, etc. (cubic feet)	21,190	50,502	264,870

WRITE US IF INTERESTED.

(Elmwood Place Branch P. O.)

CINCINNATI, OHIO.

KERR MURRAY MANUFACTURING COMPANY,

Engineers and Manufacturers

APPARATUS FOR COAL GAS PLANTS,

SINGLE AND DOUBLE-LIFT GASHOLDERS AND STEEL TANKS,

Latest Improved

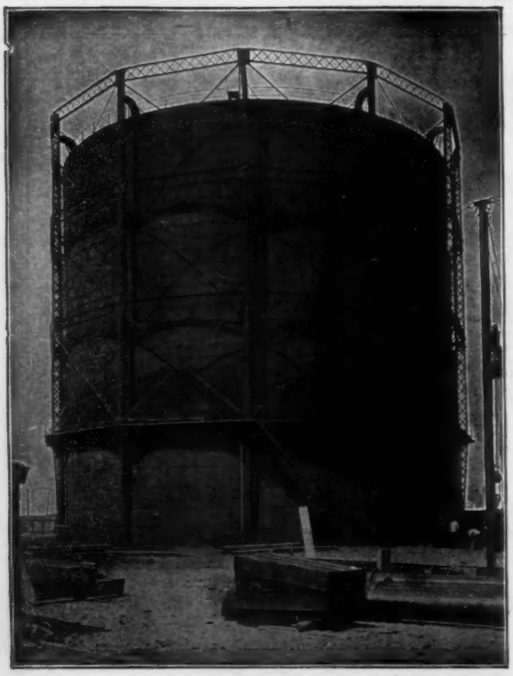
ROTARY EXHAUSTERS, P. & A. TAR EXTRACTORS, AMMONIA WASHERS,

CONDENSING, SCRUBBING AND PURIFYING APPARATUS.

Street Specials and Valves.

ADDRESS:

KERR MURRAY MANUFACTURING COMPANY, FORT WAYNE, IND.



JOHN FOWLER, President. J. SCOTT FOWLER, Vice-Pres. & Treas.

DEILY & FOWLER MFG. CO.,

39 Laurel Street, Philadelphia, Pa.

ESTABLISHED 1842. INCORPORATED 1908.

BUILDERS OF

GASHOLDERS,

Single-Lift or Telescopic,

With or Without Steel Tanks.

Oil Storage Tanks, Water Tanks, Etc.

ESTIMATES CHEERFULLY FURNISHED.

CORRESPONDENCE SOLICITED.

ASK ABOUT OUR

VICTOR BLOWERS,

For Use with Industrial Gas Appliances.

WE ALSO SOLICIT YOUR INQUIRIES FOR

GAS EXHAUSTERS,
HIGH PRESSURE GAS PUMPS,
BOOSTERS,
HUNTOON GOVERNORS,
PRESSURE REGULATORS,
BLAST VALVES,
ETC., ETC.

THE CONNERSVILLE BLOWER COMPANY,

Connersville, Indiana, U. S. A.

NEW YORK OFFICE, 50 Church Street. CHICAGO OFFICE, 536 Monadnock Building.

AMERICAN GAS ENGINEERING PRACTICE,

By M. NISBET LATTA, C.E. PRICE, $4.50.

For Sale by

AMERICAN GAS LIGHT JOURNAL, - 42 Pine St., New York City.

D. McDONALD & CO.,

971-997 BROADWAY, ALBANY, N. Y.,

MANUFACTURERS OF

DRY GAS METERS, STATION METERS, PREPAYMENT METERS, METER PROVERS AND GAUGES.

THE GLOVER PREPAYMENT METER,

Simple, Strong, Satisfactory.

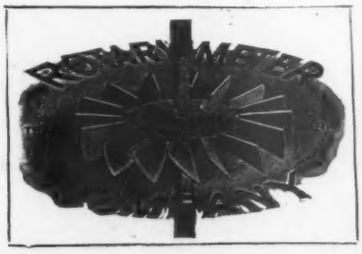
THE HINMAN STATION METER DRUM,

The greatest advance that has been made in 20 years in the ACCURATE and ECONOMICAL measurement of gas in large quantities. :: :: ::

NEW YORK OFFICE: 561 West 47th Street. | ALBANY OFFICE: 991 Broadway. | CHICAGO OFFICE: Jefferson and Monroe Streets.

We can meet your requirements for

STATION METERS



On all capacities from 1,500 to 500,000 cu. ft. per hour.

One-half the Cost—One-tenth the Space of Old Style Wet Meters.

When in Need of Station Meters Write

ROTARY METER COMPANY,

280 Broadway, NEW YORK.

Our Literature and all information will be sent on request.

The Sprague Meter Co.

Manufacturers of

Cast Iron Gas Meters

for

Artificial or Natural Gas

Plain or Prepayment

Lower in first cost and cheaper to maintain than any meter on the market.

Write us for particulars.

The Sprague Meter Company

203 Water St., Bridgeport, Conn.

R. D. WOOD & CO.,

400 CHESTNUT ST., PHILADELPHIA,

MANUFACTURERS OF

Cast Iron Pipe.

HEAVY LOAM CASTINGS,

Dunham Specials,

Hydraulic Work,

LAMP POSTS, VALVES, ETC.,

Gas Power Plants with Producers.

BUILDERS OF

Gasholders.

Single or Multiple Lifts, with or without Metal Tanks.

PURIFIERS, CONDENSERS, SCRUBBERS, BENCH WORK.

Cutler's Patent Freezing Preventer for Holder Cups.

NATHANIEL TUFTS METER COMPANY,

455 Commercial St., Boston, Mass.

PREPAYMENT GAS METERS,

WET AND DRY GAS METERS, STATION METERS, ETC.

REPAIRING OF ALL MAKES OF METERS, AND FITTED WITH OUR PREPAYMENT ATTACHMENT.

B

METERS.

INCREASED CAPACITY.
INCREASED EFFICIENCY.

PREPAYMENT METERS, STATION METERS, METER PROVERS, ETC.

PROMPT AND CAREFUL ATTENTION TO ALL REPAIR WORK.

MARYLAND METER COMPANY,

BALTIMORE.—CHICAGO.

YOU NEED ONE OR MORE OF OUR COMPLAINT METERS.

METERS, Plain and Prepayment,

For Artificial or Natural Gas.

Repairing All Makes and Attachments Added if Desired.

SPECIAL METERS FOR ACETYLENE.

KEYSTONE METER COMPANY,

ROYERSFORD, PA.

AMERICAN METER CO.,

NEW YORK, ST. LOUIS, PHILADELPHIA, SAN FRANCISCO, CHICAGO,

Wet and Dry Gas Meters, Station Meters, Meter Provers, Photometrical Apparatus, Gauges,

PREPAYMENT METERS,

REGULAR METERS REFITTED WITH PREPAYMENT ATTACHMENTS.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION CORRESPONDENCE SOLICITED.

METRIC METAL WORKS,

MANUFACTURERS OF DRY GAS METERS.

EXTRA HEAVY TIN METERS AND IRON-CASE METERS

FOR ARTIFICIAL OR NATURAL GAS.

TOBEY CAST IRON NATURAL GAS METERS—METER PROVERS.

WESTCOTT PROPORTIONAL METERS FOR GAS OR AIR.

Special Attention Given to Repairing Meters of All Makes.

FACTORY—**ERIE, PA.** WAREHOUSE—**KANSAS CITY, MO.**

12-Inch High Pressure Governor.

REYNOLDS' GAS REGULATOR COMPANY,

ANDERSON, IND., U. S. A.

We make all sizes for all classes of reduction,

Double and Single District Stations,

And Individual Service Governors for Reducing High Pressure.

HOLDER GOVERNORS

And Low Pressure Regulators, all of the Dry Diaphragm type.

English Agents:

THE BRYAN DONKIN CO., LTD., Chesterfield, England.

Write for Catalog.

Combination Governor.
(Governor and Mercury Seal.)

JOHN J. GRIFFIN & CO.,

1513 TO 1521 RACE STREET,
PHILADELPHIA.

539 West 47th Street,
NEW YORK.

Jefferson and Monroe Streets,
CHICAGO.

GAS METERS,

Station Meters and Apparatus of Every Description.

REPAIRING CAREFULLY DONE.

THE POSITIVE PREPAYMENT METER.

OVER 600,000 OF THESE PREPAYMENT METERS ARE IN USE IN THE UNITED STATES, AND THE DEMAND IS STEADILY INCREASING.

If you have some ordinary meters to be repaired, send them to us and let us repair and convert them into prepayment meters. They will be a source of satisfaction and profit to you.

SEND FOR OUR CATALOGUE AND OUR PREPAYMENT BOOKLET.